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WASHINGTON
UNIVERSITY
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Washington University

Fall 1982

Magazine



FOREIGN AFFAIRS



Homecoming



Washington University's early-October Homecoming was an affair of spirit, though the Battling Bears lost to Wabash College. The clown corps peppered streetside parade crowds with balloons to spread the joy and the word. At right, Pulitzer-prize winning cartoonist and alumnus, Mike Peters (Dayton Daily News), who served as parade grand marshal, shares a zany moment with student revelers Kathy Clutz, left, and Anne Swiderski, right.

Washington University

Magazine

Fall 1982

Vol. 52, No. 4

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and Photographer*
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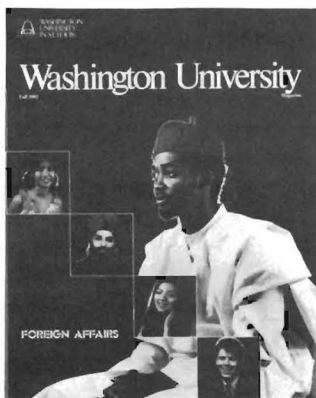
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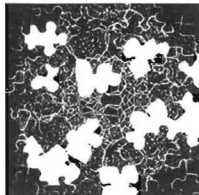
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On the cover: Raymond Okuagu, Nigeria; upper left down, Nympha Labrador, Philippines; Inderdeep Singh, India; Ivy Chow, Hong Kong; Brian Ward, England. Back cover, Gaby Versbach, Germany. See Foreign Affairs, page 17.



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Special Insert

Washington University Annual Report

The 1981-82 State of the University

The Schizophrenia

Irving I. Gottesman,
Professor of Psychiatric Genetics

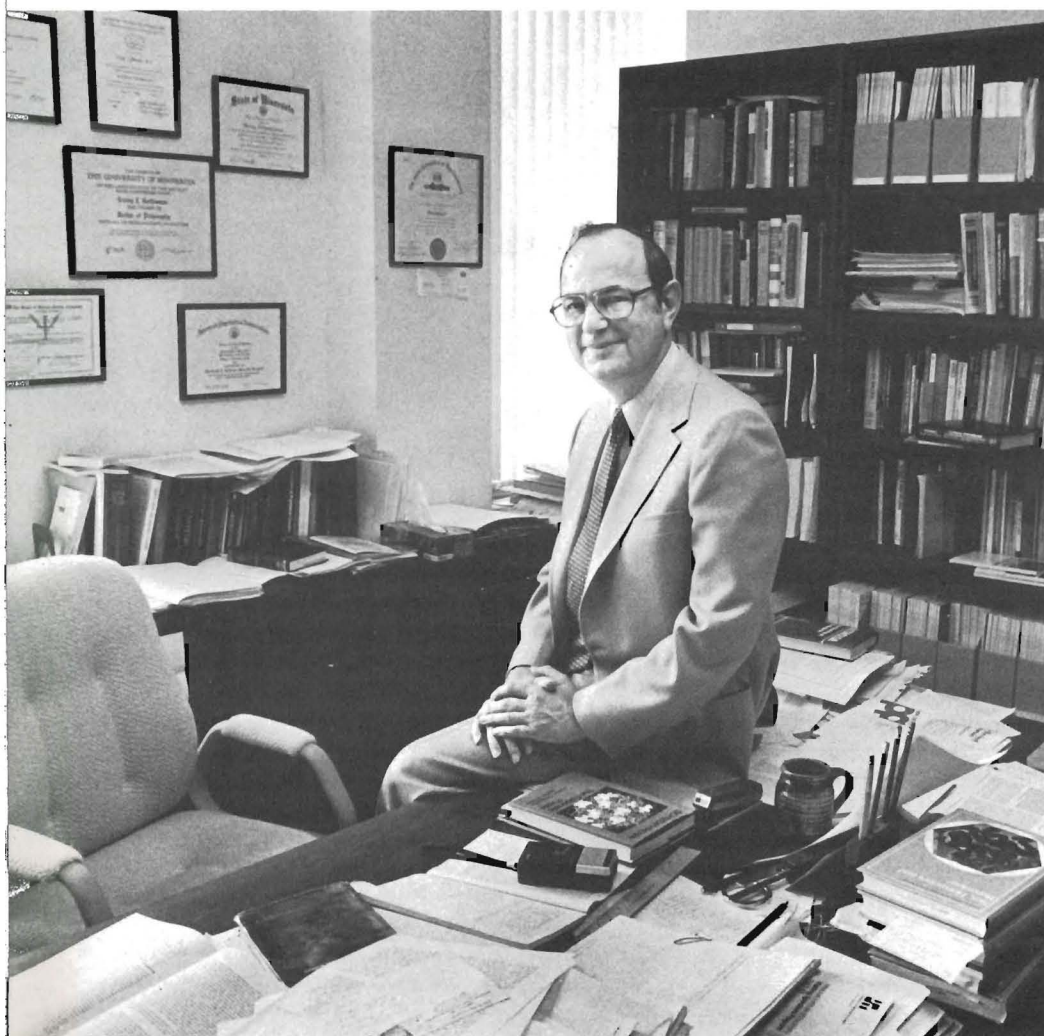
Schizophrenia: the Epigenetic Puzzle by I. I. Gottesman and the late James Shields of the Institute of Psychiatry in London was published last summer by Cambridge University Press. In this article, abstracted from his book, Professor Gottesman presents the existing genetic evidence on schizophrenia's cause and speculates on where and when the missing pieces will be uncovered.

There are many different ways to "lose one's mind." The best known form of madness—schizophrenia—fascinated scientists, philosophers, novelists, and laymen even before it was called *dementia praecox* by Emil Kraepelin of Munich near the turn of the century. It must be distinguished as clearly as possible from the other varieties of mental illness and disease depicted with varying accuracy in novels and on television if we are ever to have a science of schizophrenia. What causes schizophrenia? Are there distinct genetic- and environmentally-produced types or could the amazing range of clinical phenomena be explained as variations on a single theme? Can children unrelated or even related to a schizophrenic who are at risk of becoming affected be detected in advance? What are the relationships among infantile autism, childhood schizophrenia, and adult schizophrenia, if any? What genetic counseling, if any, should be made available to schizophrenics and their relatives?

These questions and related issues have vexed the scientific community since the Swiss psychiatrist Eugen Bleuler first used the word *schizophrenia* in 1911.

The nature, origin, prevention, and treatment of schizophrenia are among the major concerns of the Clinical Research Center for Epidemiological Genetics and Family Studies in Washington University School of Medicine's department of psychiatry.

It will be our goal to introduce readers to some of the essential facts from the growing field of psychiatric genetics and to provide a perspective for integrating the facts about schizophrenia within a broad framework called the diathesis-stressor theory. We hold the view that the genes are necessary as a predisposing tendency, but, without the addition of environmental stressors, are not sufficient by themselves for the development of schizophrenia.



Puzzle

© I. I. Gottesman, 1982

For us, schizophrenia is a puzzle and its cause (etiology) defies simplistic explanations. It is a reflection of our bias, background, and research to say that the genetical pieces are more central and more important clues to the solution than the environmental pieces. The genetical pieces provide more of the figure, while the environmental ones provide the ground, sky, and associated backdrop.

It is a truism that bears repeating to note that genes and environment are both essential for the development of any human characteristic. The task ahead is to discover how genes and environment interact to produce schizophrenia. It is much easier to talk about such interactions than to design experiments to elucidate them! Despite brilliant advances in the harder sciences of molecular biology, neurochemistry, computerized tomography, and psychopharmacology, we cannot yet detect a particular biological defect in all or most schizophrenics. Despite selfless expenditures of time and energy by therapists and sophisticated efforts in the softer sciences, we cannot implicate any specific life-experience common to all or most schizophrenics. And, despite advances in analytical power and model building by population genetics, we have no grand systems model that integrates or predicts the diverse facts about schizophrenia.

We believe that schizophrenia is a genetic disorder that makes research on it more like that on diabetes, cardiovascular disease, and mental retardation, than on such clear-cut genetic disorders as phenylketonuria, a simple recessive form of mental retardation, or Huntington disease, a simple dominant condition with late onset that affected Woody Guthrie. The evidence for the important contribution of genetic factors comes from the simultaneous consideration of facts from family, twin, and adoption studies.

Although no testable environmental theories have proved useful to date, it is essential to merge the wisdom and experience of clinicians about the roles of environment in schizophrenic-symptom formation with suggestions from geneticists that implicate disturbed neurotransmitter systems in the brain.

All data sources and designs in this area have their faults and limitations; no one has his or her hands on the "truth"; so we are skeptical about received wisdom from *all* quarters. But we hope that our skepticism will not be confused with pessimism about the solution to the schizophrenia puzzle. It will be solved, undoubtedly before the twentieth century ends.

Diagnosing schizophrenia for the purpose of genetic study is not simple. Although the limits of the concept of schizophrenia are uncertain—since we lack the yet-to-be discovered laboratory tests to confirm a diagnosis biologically—clinicians experienced in a mental hospital setting most often agree about its presence or absence in the majority of cases. Less-experienced diagnosticians often do not agree. If you were so bold as to infer the presence of schizophrenia from hearing someone tell you about a person who claimed that he or she was being bombarded by microwaves, receiving signals in the forms of different flavors of yogurt or Morse code taps, being hypnotized, or being followed by the FBI or KGB, you would err; all these "symptoms" are taken from newspaper accounts of a recent world chess tournament or of "normal" life in Washington, D.C., and Moscow. In addition, unfortunately, the too ready access to substances such as LSD, amphetamine (speed), and phencyclidine (angel dust) often leads to short-duration reactions that mimic genuine schizophrenia closely enough to lead to false positive diagnoses.

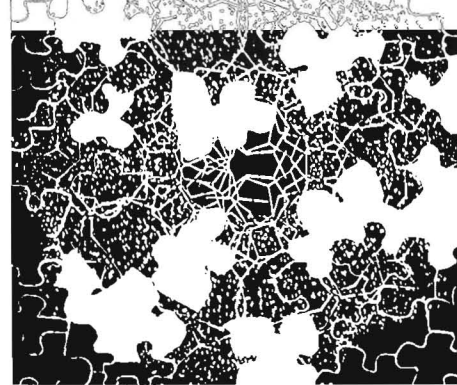
How then do contributors to the literature on the genetic aspects of schizophrenia decide who the original

subjects (probands) or index cases will be and who among their relatives will be counted as schizophrenic?

Schizophrenic symptoms are more specific than some would have us believe and less specific than others would have us believe. A major impediment to discerning a pattern in the schizophrenia puzzle is the disquieting variation among researchers as to what constitutes "proper" schizophrenia in both original subjects and their relatives. Virtually all the literature has used diagnoses based on the impression made on clinicians with varying expertise by a patient or, often, by the hospital chart of a dead or unavailable patient.

The present-day emphasis on research diagnostic criteria, such as those embodied in the DSM-III (*Diagnostic and Statistical Manual of Mental Disorders*, 3rd Edition, 1980) and the structured interviews of the Present State Examination or the Diagnostic Interview Schedule, represent a codification of what most clinicians had been doing all along. These approaches permit the training of new diagnosticians to a standard. The question of valid diagnosis, however, must stand on additional data. We must examine the studies carefully; not all are of equal merit and some legitimate concerns have been raised.

Schizophrenia is known by its *psychopathology*; not its biology. It is by the psychological symptoms presented by patients or their never- (or not-yet) hospitalized relatives that we recognize it. However, the early descriptions of Kraepelin and Bleuler were so elucidating that individuals called schizophrenic in Western Europe in the first part of this century would still be called schizophrenic. As spelled out in the World Health Organization Classification of Mental Disorders, schizophrenia involves a fundamental but not absolutely specific disturbance of personality, a more- or less-characteristic



The Schizophrenia Puzzle

disordering of the process of thought, a frequent sense of being controlled by outside forces, bizarre perceptions and delusions, and inappropriate emotions. The picture becomes even more striking since clear consciousness (no confusion) and intellectual capacity are usually maintained, and the person, who considers his/her own behavior to be natural and rational, sees no reasons why others are making such a fuss. One of the early workers used the phrase *intrapsychic ataxia* metaphorically to suggest some kind of basic neuropathological defect.

If we set aside, temporarily, the thorny problem of accurate diagnosis, the problem of counting the number of persons in the United States affected by schizophrenia remains. Such concrete and important factors as the cost and availability of hospital beds, day care, and rehabilitation services often dictate how cases are counted. If we ask how frequent is schizophrenia and when and where does it occur, we are answered by a bewildering array of actuarial statistics. Based on reliable studies in Western Europe that used careful diagnoses, we can estimate the lifetime risk of developing schizophrenia for a random person in the general population: it is one in one-hundred, or 1 percent by age fifty-five.

Though these statistics do not necessarily meet the needs of genetic investigators whose major concern is with causes, epidemiological approaches do provide facts that must be compatible with the diathesis-stressor theory. Even as geneticists, we are as interested in specific environmental variables as in differing amounts of genetic similarity. We would welcome a demonstration that some environmental risk factor would predict in a designated group of the general population—but not one related to a schizophrenic—a 10 percent rate of schizophrenia. That, then, would be comparable to our finding that for the

sibling or the child of a schizophrenic—who thus shares, on average, 50 percent of their genes—we can accurately predict a 10 percent risk of developing schizophrenia. We are in dire need of environmental/epidemiological studies—of social-class-specific, psychological-stress-specific, physical-insult-specific, and ethnic- (with and without immigration) specific rates of schizophrenia—as aids to theorizing about primary causes.

We have looked in vain for a large environmental influence indicated by epidemiological studies. If there were marked changes in the apparent incidence of schizophrenia over a long period of time, it could imply an impact of industrialization-urbanization or a change in the frequency of relevant genes. If there were a change over a short period of time, it could implicate the aftereffects of a viral epidemic, the impact of some preventative agent (e.g., adding vitamins to milk), or a marked change in childrearing practices. The foregoing suggestions are only examples.

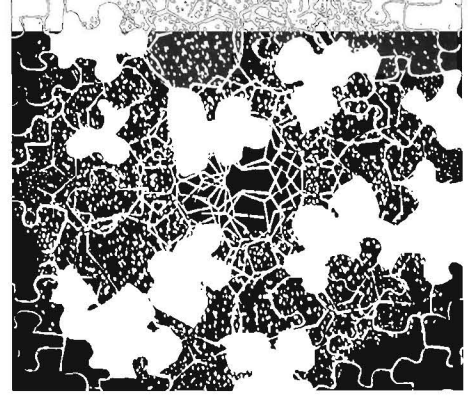
We have seen a dramatic reduction in number of schizophrenics confined to our state and county mental hospitals. In the short interval of ten years, from 1965 to 1975, the total resident population of such hospitals was reduced to only 40 percent of the earlier period; in the even-shorter interval from 1969, the number of resident schizophrenics was reduced from 184,000 to 93,000. But obviously, this does not mean a change in the incidence of schizophrenia; the simple explanation lies in the changes in health-care delivery. The schizophrenics are still there, but they are seen and counted in different settings.

Now that many mysteries of the chemical nature of heredity materials have been solved, it seems appropriate to begin a genetic primer from that standpoint. Genes, the building blocks, are segments of long-stranded molecules composed of

deoxyribonucleic acid (DNA). An amazing fact of molecular genetics is that all of the *information* needed to construct a pine tree, an armadillo, or a human baby is encoded into these molecules. The DNA of each species carries somewhat different information from all other species, but the characteristics of DNA are the same across most all species. Just as there are genetic differences across species, there are genetic differences within species: different people have different eye colors and different blood groups, to name two examples. There are about seventy trillion different human genotypes possible (but only four billion people on earth).

The double-stranded DNA of humans contains at least 60,000 to 100,000 structural genes, and perhaps as many as two to five million genes altogether. To package so much information in such a small space as the nucleus of one cell, the DNA strands are tightly coiled to form compact bundles called chromosomes. Each species has a characteristic pattern of chromosomes. In humans, twenty-two pairs are called autosomes and are homologous, that is, the two members of the pair are quite similar; one pair, the sex chromosomes, may be homologous with two X chromosomes (females) or may be nonhomologous with an X and a Y chromosome (males). Every individual receives one member of each of the twenty-three pairs from his or her mother and the other from his or her father. The combination of the genes on these chromosomes determines intraspecies variations.

The bulk of gene-influenced human variability arises not from the simple, observable dominant-recessive gene combinations observed by Mendel (called Mendelian genes of major effect) nor from chromosomal errors, but from polygenic effects—many genes interacting with each other and with the environment—that are not individually detectable with present technology.



The expression of any polygenic trait depends on the combination—both in the number and in kind—of genes inherited.

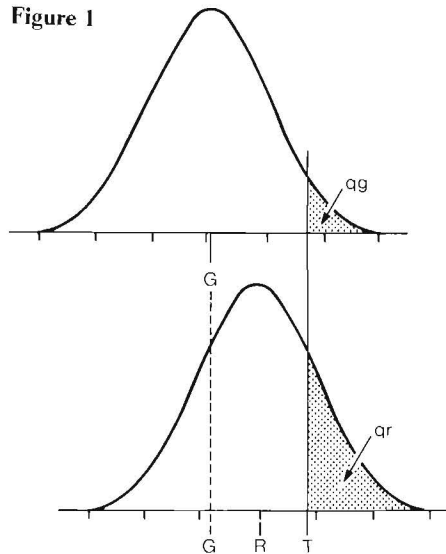
Abnormalities, such as diabetes, arteriosclerotic heart disease, hypertension, cleft lip, and schizophrenia conform to established characteristics of polygenic inheritance: (1) a clinical range of disability occurs from borderline through severe, (2) severely ill primary subjects have more affected relatives than mildly ill primary subjects, (3) the risks to relatives increase as the number of other affected family members increases, (4) a sharp dropoff in risk occurs as one goes from close genetic relatives (46 percent in identical twins) to distant ones (2 percent in first cousins), and (5) a distribution of cases is seen on both maternal and paternal sides of a family.

The kind of genetic system described here allows two normal parents to produce a child with a genetic predisposition to schizophrenia—the situation for 90 percent of schizophrenics. Remember that two short parents can produce children who will be taller than either one of them, even when the family shared the same nutrition.

In dealing with these elusive polygenic effects, we sometimes find that for some common disorders and congenital malformations, the distribution of genotypic potential is not continuous but gives rise to discrete categories. This can be explained best by assuming a continuously distributed combined liability (genetic and environmental) and a threshold. Then the discontinuity is not genetic but results from a liability variable exceeding a threshold that may be psychological, biochemical, developmental, or mechanical.

A simplified version of a single-threshold model for schizophrenia is shown in Figure 1. The upper distribution represents the posited liability in the general population with a mean of G , and the proportion of affected in-

Figure 1



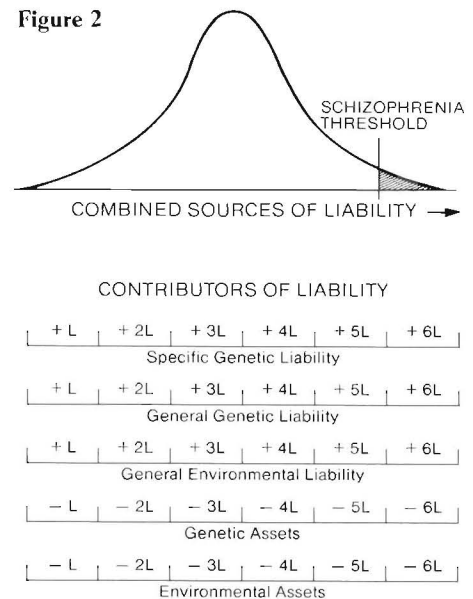
dividuals (1 percent) equals the area under the normal curve, q_g . The lower curve represents the distribution of liability for probands' siblings and children who are at risk for the disorder; their mean liability is R and the proportion affected is q_r , (about 10 percent). Just as relatives of schizophrenics are at higher risk for the disorder, relatives of individuals at the left end of the general population distribution obviously will have lower than average risks for the disorder; it is a mistake to think of the general population risk of 1 percent as *minimal*. It is also clear from the distribution of liabilities of relatives of schizophrenics, that only a fraction of the relatives have a high risk for the disorder; many have liabilities actually below the general population mean liability.

In discussions about liabilities that focus on genetic predispositions, it is too easy to lose sight of the crucial contribution of environmental factors, as well as assets of strengths. Figure 2 schematically illustrates what we believe to be the various components of the concept of total liability to the probability of developing schizophrenia. The variables of specific-genetic liability, general-genetic liability, and

general-environmental liability are taken into account, as well as what must be assets, both genetic and environmental. Assets could include traits such as good problem-solving ability and resistance to anxiety arousal. These variables can be used to talk about an individual's position on a combined liability as a function of his or her total balance sheet.

Specific-genetic liability is central to our story but forms only a part of the liability. Genes here are specific in the sense that they contribute more to your liability to schizophrenia than to some other disorder—for instance, high blood pressure. The next two contributors, general-genetic and general-environmental liability, serve as modifiers or potentiators of the specific liability. Lastly, provision is made for both genetic and environmental assets, and they are shown with negative values to indicate that they reduce liability. It is only when the sum of the liability- and asset-contributors exceeds a threshold value that we will have a diagnosable case of schizophrenia. Note that no provision is made for a specific-environmental liability—none has been identified.

Figure 2



The Schizophrenia Puzzle

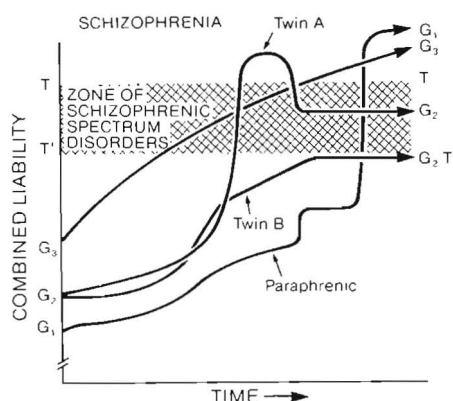
The model is overly simple, but it does account for recovery from an episode of illness as assets are added, for different outcomes in genetically matched individuals, such as discordant identical twins (one of whom is schizophrenic and one of whom is not) who have encountered different stressors, and for discordances in individuals matched for their stressors/life events who differ genetically.

The static, cross-sectional depiction of schizophrenia implied by these threshold models is helpful for understanding but unsatisfactory. While we await advances in the neural sciences to permit the identification of some relevant "final common pathway" involved in schizophrenia with a consequent identification of endophenotypes (inner states) worth measuring as indicators of liability, we can add the necessary complication of *epigenesis*. Epigenesis implies a developmental unfolding process modulated by internal gene regulation and external information from experience. These operate in a mutually influencing feedback system, like a thermostat in a heating/air-conditioning system. Then, by adding the dimension of time to our static liability model, we can represent a more realistic view of a person's trajectory across the epigenetic landscape.

The intention of our final model is to incorporate into a dynamic system the concepts of possible critical periods (prenatal and postnatal) and of changes in effective genotype by gene regulation (the switching on and off of genes by environmental inputs) and ecological inputs (assets and liabilities). Figure 3 represents our crude attempts to illustrate schematically a more realistic multifactorial model to explain the cause of the disorder at the level of the individual schizophrenic.

Our time axis starts from egg fertilization so that possible prenatal factors could show their influence. Maturation

Figure 3



constitutional changes, as well as random events, will lead to both downward and upward inflection in the curves. (We would also expect that augmentations or reductions in liability that occurred close together in time would have a snowball effect—be more influential than the same forces spread out in time.) Figure 3 represents the combined liabilities over the first fifty years toward developing schizophrenia for three genotypes: one of the genotypes, G_2 , is represented by a pair of identical twins.

G_1 is intended to be a person with a low (for schizophrenics generally) combined *genetic* liability who developed a late-onset paranoid schizophrenia. Over time, environmental contributors to liability—for instance, the death of a spouse and then the onset of deafness—culminate in a late-onset schizophrenia.

G_2 could be the divergent trajectories of identical twins with moderate other "scores." Only our A-twin encounters sufficient factors over time to lead to schizophrenia with an acute onset. The B-twin at the time of observation is discordant for schizophrenia, but close to the posited threshold of schizophrenia-spectrum disorders. Sub-threshold values of combined liability make it clear why so many first-degree relatives can have normal personality

test scores and normal lives, and why two clinically normal parents are the rule for the vast majority (some 90 percent) of schizophrenics. The A-twin is shown to have an acute onset—but would most likely have been undiagnosed prior to the illness—followed by a remission into a chronic schizotypal-personality disorder.

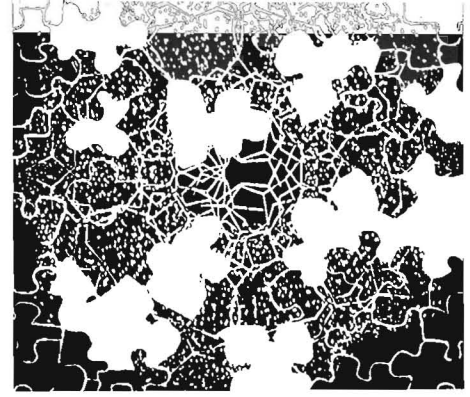
G_3 represents an individual with an unusually high loading for schizophrenia.

Our case for the role of genetic factors in the causes of schizophrenia is built on clinical population-genetics data, but it implies a biochemical or biophysical cause for the brain malfunction.

Despite the elements of uncertainty, our present knowledge permits us to conclude unequivocally that genetic factors are importantly involved in schizophrenia. Some of the factors are probably specific. By "specific" we mean that some genes, whatever their effects on other traits, contribute to the liability of developing this disorder rather than, or more than, they do, say, to high cholesterol levels, diabetes, or anxiety neurosis. We believe the specific schizophrenia-related genes are differentiable from the general genetic contributors to the total liability, and that the latter will serve as modifiers or potentiators. Regrettably, no individual schizophrenia-related gene has yet been identified, let alone characterized biochemically or biophysically.

Whatever ultimate form the puzzle solution takes, it will have to accommodate itself to the following set of large puzzle pieces:

- No environmental causes have been found that will invariably, or even with moderate probability, produce a genuine schizophrenia in persons who are unrelated to a schizophrenic index case.
- Schizophrenia occurs in both industrialized and undeveloped societies. In the former, the lifetime risk (with



conservative diagnostic standards) is usually about 1 percent by age fifty-five, with the age at onset ranging from puberty to sixty-five and peaking in the early twenties.

- Within large urban communities there is a marked social-class gradient in the prevalence of schizophrenia (about four times as much in the inner city as in its suburbs), but this can be attributed to downward social drift of predisposed persons before the illness is too obvious.

- The risk of schizophrenia to the relatives of index cases increases markedly with the degree of genetic relatedness, even in the absence of shared, specific environments. The observed risks, however, are not compatible with any simple Mendelian-genetic model and some 80 percent of schizophrenics do not have an affected parent or sibling.

- The risk to the relatives varies with the severity of the proband's illness, the number of relatives already affected and/or healthy and, in the case of offspring, with the mental-health status of the other parent; given both parents schizophrenic, 46 percent of their children grow up to be affected (reducing to 13 percent if only one parent is ill).

- Gender/sex is not relevant except for age at onset. Paternal half-siblings of index adoptees are as often schizophrenic as the maternal half-siblings; offspring of male schizophrenics are as often schizophrenic as those of female schizophrenics; male and female risk is equal by the end of the risk period; female identical twin pairs are not significantly more concordant than identical males; and, opposite-sex fraternal pairs are as concordant as same-sex pairs.

- The identical twin concordance rates (46 percent) for schizophrenia are at least three times those of fraternal twins (14 percent) and some thirty-five to sixty times the general population risk. (Note that one-pack-a-day cigarette

smokers have twenty times the risk of non-smokers for death from lung cancer.)

- More than half of the identical twins in recent studies are discordant for schizophrenia despite sharing all their genes, thereby demonstrating unequivocally the importance of environmental contributors to liability.

- Neither identical nor fraternal twins as such are at a higher risk for schizophrenia than singletons.

- Identical twins who are clinically discordant (one is schizophrenic, the other not) each transmit schizophrenia to their offspring at the same high rate. This fact underscores the reality of the concepts of incomplete expression of genes and further undermines explanations involving psychological identification or imitation.

- Identical twins reared apart from childhood (twelve authenticated pairs) are concordant to about the same extent as those reared together. When considering this situation, however, one should realize that raising identical twins in different homes is a very rare event yielding information that may not be generalizable.

- Children of schizophrenics placed early for nonfamilial adoption still develop schizophrenia as adults at rates (7 percent to 16 percent) considerably higher than the population rate, sometimes as high as those rates in children reared by their own schizophrenic parents.

- Adoptive relatives (step-parents, step-siblings) of schizophrenic adoptees do not have elevated rates of schizophrenia, but the biological relatives of such adoptees do have.

- Children of normal parents "cross-fostered" into homes where an adoptive-parental figure later became schizophrenic, do not show an increased rate of schizophrenia.

- Probands whose schizophrenia-like psychoses occur after head injuries or epilepsy have first-degree relatives

whose risks for schizophrenia (1 percent) do not differ from those of the general population. This point emphasizes the reality of non-genetic schizophreniform of psychoses (phenocopies or imitators) and the necessity for accurate diagnosis, since there are many imitators of schizophrenia.

- Excessively critical/hostile interactions and/or overly intrusive interactions with relatives increases the relapse rate of schizophrenics in remission. This points toward a strategy for social intervention that should complement drug treatments.

- Childhood psychoses appearing before puberty do not appear to be genetically related to schizophrenia.

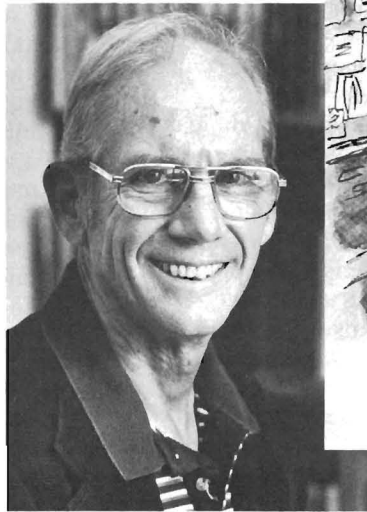
- The observed risks in different classes of schizophrenics' relatives are compatible with a multifactorial-polygenic-threshold model of transmission similar to that found useful for advancing knowledge about other common genetic diseases.

- Since no *corpus delicti* has yet been found that can be equated with a genotype for schizophrenia, the premorbid (before disease onset) schizophrenic is currently not identifiable. Hence, ambiguity and uncertainty haunt the attempts to solve and complete the schizophrenia puzzle.

It bears repetition that our studies indicate both the unspecified genes and the unspecified environments are necessary, but are not in themselves enough, for developing schizophrenia. We need to pursue efforts to find good endophenotypes (tell-tale inner states that reveal heredity) and true genetic markers of vulnerable genotypes; and we need to push ahead basic research on how the brain works. We are far from a dead end.

Self-criticism

William Connor
Education



"Too bad about old Ainsworth. Published and published,
but perished all the same."

Drawing by B. Tobey; © 1982 The New Yorker Magazine, Inc.



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Herbert Metz
Performing Arts



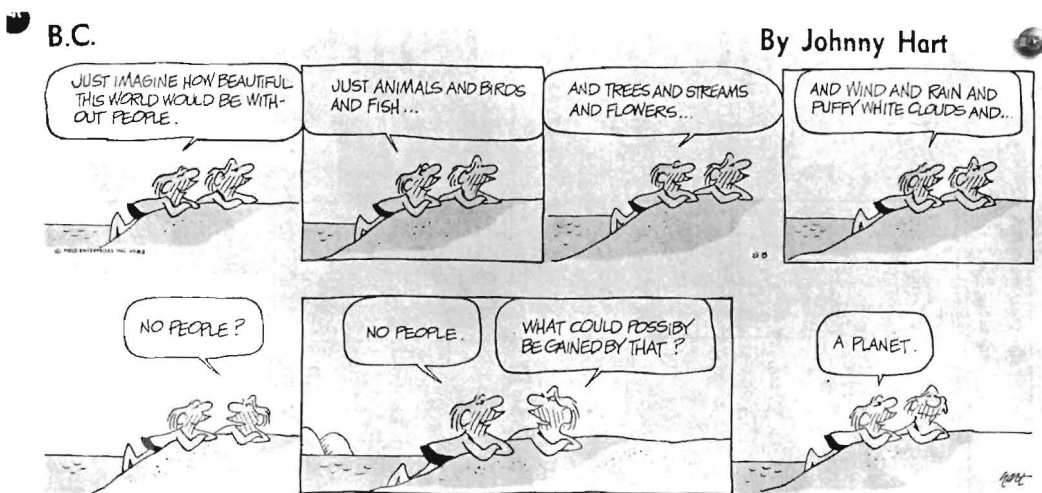
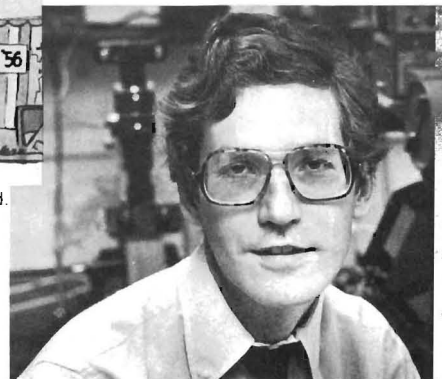
Though the school year is young, faculty doors and hallway bulletin boards already sport a variety of worldly comment on the academic venture. As the year ages, the editorial voice represented by this act of clipping out and tacking up will become more strident. It is, in its rib-tickling way, an act of self-criticism.

DOONESBURY



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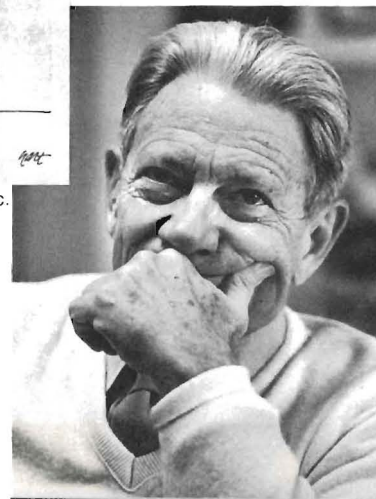
Stephen Rothman
Pediatrics



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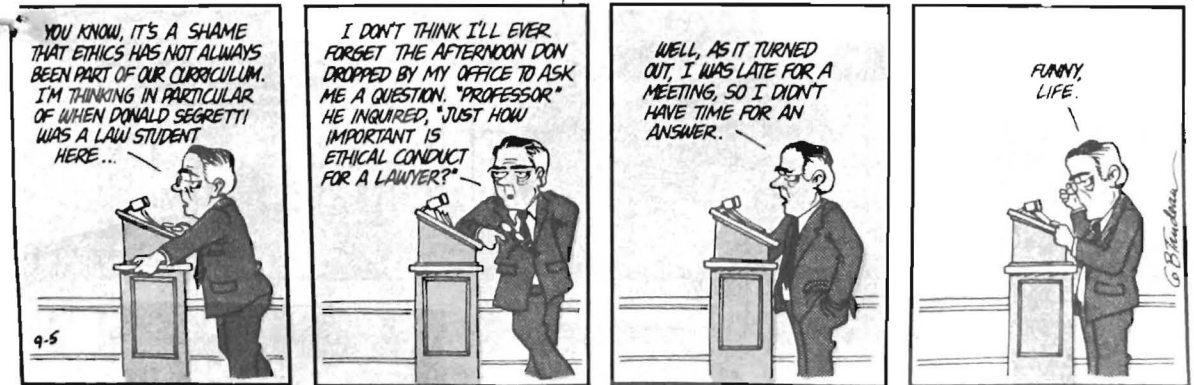
By Johnny Hart

John Bennett
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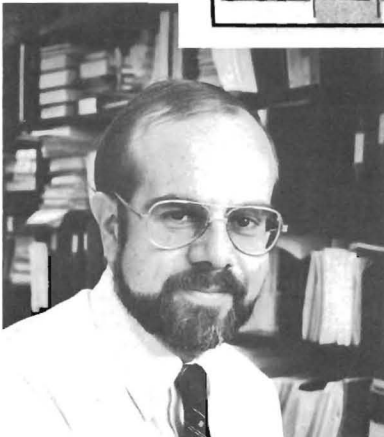


Self-criticism

DOONESBURY—By Garry Trudeau

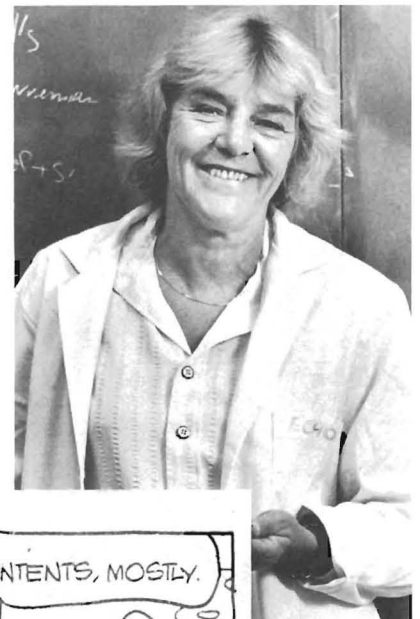


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Edward Imwinkelried
Law

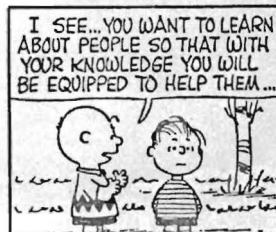
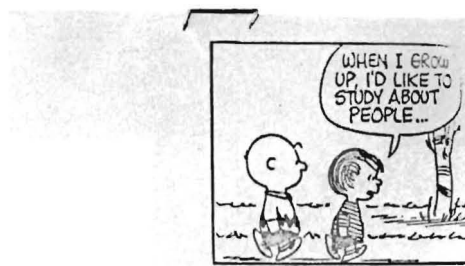
Dorothy Echols
Earth Sciences



ANIMAL CRACKERS



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Andy Finn
Psychology

SHOE—By Jeff MacNelly



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Mary Gallatin
English



A high-contrast, black and white graphic illustration. The top portion shows a dark, wavy shape representing a forehead or hair, with a single white five-pointed star centered on it. Below this is a thick black horizontal band containing the title in white, bold, sans-serif capital letters. The bottom portion of the image depicts a stylized face in profile, looking downwards. The face is rendered in dark gray against a white background, with jagged, torn-paper-like edges separating the different sections of the composition.

REFLECTIONS ON A REVOLUTION

Silvia Pedraza-Bailey, a native of Cuba who emigrated with her family in 1960, has returned to Cuba twice in the last few years to research her work on Cuban and Mexican immigration to the United States. An assistant professor in Washington University's department of sociology, she holds the Ph.D. degree from the University of Chicago. Tarek Hamada, a senior in arts and sciences, is pursuing a career in journalism.

Hamada: From your experience in Cuba, your interviews with refugees, and your research, how would you assess the mood of the people in Cuba today?

Pedraza-Bailey: For my research on policy changes regarding the Cuban exodus, I recently read through more than twenty years of *Granma*, the official Communist party newspaper. Reading it, I underwent an emotional transition that I imagine is very close to what my people in Cuba experienced, but very gradually. In the early years, there was a sense that a new society was being built, and every action contributed, as Castro said, "another step on the road of building communism in Cuba." Even the scarcity Cubans lived with had merit. For example, in 1961 Cuba ran out of paper. Writing letters, drawing a sketch, taking one's photograph for posterity were nearly impossible. Raul Castro told the people, "We have run out of wood, but we are planting trees today; we are planting a new seed that will someday sow." This was a symbol that the revolution was just beginning and would bear fruit in the future. But there is still not paper in Cuba. After twenty-three years, those speeches sound hollow. For most Cubans now, there is an enormous credibility gap between the things promised and delivered. Certainly for the Mariel refugees and many more in Cuba, these were false promises.

Hamada: Some people argue that the 1980 exodus was partly due to the more than 100,000 exiles who returned home saying, look at everything that we have.

Pedraza-Bailey: The Mariel refugees have also told me that the return visits helped to release the exodus: not because their relatives returned with stories of achievements, but because they looked like they had decent lives. After twenty years, many relationships that had fallen out of use were reestablished, and those in Cuba could ask, "If I come,

will you help me get on my feet?" But the incentive to leave was not just economic. I have a good friend from Mariel, who now drives a second-hand car and holds a modest job cleaning while attending night school. Whenever we speak, she always stresses that what matters most to her is the freedom. In Cuba, her life was completely controlled, and she was imprisoned for writing "Down with Fidel" on the walls.

Hamada: What have the recent immigrants told you about the Committees for the Defense of the Revolution?

Pedraza-Bailey: In many ways, the history of the Committees for the Defense of the Revolution is a microcosm of the history of the revolution. In the beginning, counter-revolution was widespread, the exodus was a flood. The committees were initiated at the end of 1960 for surveillance. Raul Castro reminded them, "You are supposed to keep an eye on everybody and a hand grasping onto their neck." That task they fulfilled. Since they are a block by block organization, they know everyone who comes into your house, everyone who leaves, what time you arrive and depart. After the failure of the Bay of Pigs, both the exiles and the Cuban government saw the revolution as consolidated. The counter-revolution virtually ceased and the Cuban exiles got busy with the task of living in America. Then the CDR's took on more positive functions, and their block by block organization helped to spread the public health services. Cuba wiped out tuberculosis in record time by delivering the vaccines to the CDR's, who made sure every child on the block was inoculated. But now they have returned to their function of surveillance. Since the 1980 exodus, Cuba is back to what it was in the beginning: enormous discontent and dissent, an enveloping bitterness that is palpable on the streets. Once again, you have to

declare yourself. For example, after the Mariel exodus, those who stayed staged a massive march of support.

Hamada: Were they really sincere?

Pedraza-Bailey: Sincerity is very difficult to assess in a society where there is enormous control. Clearly there are people in Cuba who strongly believe in the revolution. They have given it everything they have to give, suffered with it over the years, and will continue to do so, expecting Castro to deliver them from a terrible past to a better future—someday. A second category is people who are opportunistic, who jumped on the bandwagon that came. Those people exist in every society; we have them too. But there is a third category, which is what makes living in a society like Cuba different: people who may not be for it, but who do not have the choice of staying out of it. In Cuba, you participate or you become suspect. And they ostracize and jail the suspect. Therefore, many people engage in dissimulation. They live one life in public and another life behind. And to the life behind, they admit very few people, because it is a big risk. I will give you an example. When I went to Cuba, I visited the family of my friend from the Mariel exodus. She gave me some small things to take to her family: chewing gum, hair clips for the girls. I wanted not only to let her family know that she was well, always remembering them, but also to allow myself to see what life was like for decent, working-class people. Of course, I visited my family, but they still are the middle class. When my friend's brother, a construction worker, came for me at the hotel, he phoned me from the lobby, greeting me with "compañera." That is what everyone calls everyone else in Cuba. It signifies: We are with the revolution. Then we sat on a bench, just outside the hotel, alone, with no one near. I asked him a great deal; he told me details about Cuba I had never heard before. At one point, he pulled out a

book, like a passport, an identification book: with his name, photograph, a number, addresses at home and work. "Everyone has one of these," he said. "You see this number. That number is a file. And in that file they have your life. They know where you are, where you work, where you live. Each of us has a complete file." This impressed itself inside me deeply: the dissimulation with which people live all the time. It happened over and over again.

Hamada: What produced Cuba as it is today?

Pedraza-Bailey: Our legacy. Like most of the Caribbean and the Third World, we come from societies produced by colonialism, by the enormous intervention of the foreign powers, whether British, French, or American, in both the economy and the polity; we come from plantation societies that produced racism and inequality among races; we know the constancy of poverty and overpopulation. In *The Middle Passage*, V.S. Naipaul concludes that these accumulated pressures had left the area with an enormous tendency towards authoritarianism because the leaders who emerge tend to be protest leaders—leaders that say, "We will break with this past and create a different future." Our legacy saddled us with a tendency toward authoritarianism, of the left and the right, both of which are equally evil to my mind. Cuba claimed that if we rid ourselves of capitalism and American intervention and built a communist society, poverty, privilege, and racism would disappear. But the answers Cuba devised to our problems have not solved them either. When having a new car depends on being a party member, and having a television set depends on being in the Committee for the Defense of the Revolution, that is in no sense equal. Nor is it free.

Hamada: What do you think about the claim that personal life is better now than under Batista? For ex-

ample, women are not cheapened through prostitution. What do you think of this moral aspect of the revolution?

Pedraza-Bailey: The Revolution has done some good things, and I do not wish to deny either the good or the harm. The eradication of prostitution and vice, the spread of the educational and health services all over the country: those are very good. In a society, however, where people's lives are completely controlled, people feel that is good, but it is not enough. It is better than the years of Batista? Batista was horrible: corruption and repression marked his regime. Those are the roots of the revolution. There wasn't a Cuban left in Cuba at the beginning of the revolution who was not against all that and for the revolution. However, there is now twenty-three years of something else. To my mind, the best analogy is a woman whose first husband was a wife-beater. The second husband is sweet, treats her well, brings her flowers. It just so happens that he is an alcoholic and cannot hold a job. For some years, she says to herself, "It's too bad that he has passed out once again, and this other job hasn't worked out, but he is kind to me and never beats me." That lasts a while. But after a number of years, she begins to say, "Hell, this one is an alcoholic." At some point, the legitimation that no matter how bad this is, it is better than what used to be runs out on people. It has run out on a lot of people.

Hamada: Did you feel people were trying to convey something to you because you were Cuban?

Pedraza-Bailey: Working-class people were constantly trying to deliver a message. When I ordered a sandwich, the waiter told me that he could only bring crackers and cheese, for a sandwich you needed a party card; when I climbed in a taxicab where life was ephemeral, the driver told me that he could not drive as far as I wanted because

he had little battery left and the only new cars Cuba imported had all gone to the party. One man, a former bus driver, was very explicit. "I used to drive a bus," he said. "On my route was the big store they built for the foreigners. So when the exiles returned, they would ask me to let them off at that store. As soon as we were near it, I would tell them, 'Look at what the revolution has done: that store is for you and for the party, but the rest of us can't buy there. But it's very good that it exists for you. This is what the revolution has done.'"

Hamada: Don't people participate in People's Power? That is what Martha Hanneker argues in *Cuba: Dictatorship or Democracy*?

Pedraza-Bailey: It depends on what we think of as participation. My favorite analogy is to our universities. We have myriad little committees—some to welcome students, others to bid them farewell—in which we all participate, but none of them touch the essentials of the university. In Cuba, people participate in lots of these little committees that decide things whose outcome no one cares about. In so doing, they legitimate the fact that only a few people make all the critical decisions. Hence, it is not that people are not sincere. We do in sincerity welcome students and bid them farewell; in Cuba, in sincerity they decide where to build a restaurant. But people do not participate in anything whose outcome is critical, because those decisions don't go outside of the party. Moreover, the Central Committee controls the party, and Fidel Castro controls the Central Committee. All the new institutions created in the last decade have not changed that hierarchy of control.

Hamada: What about racial discrimination? What about the place of women? Have things changed much?

Pedraza-Bailey: One of the big draws of the revolution came at the outset when they rightfully eradicated the



Silvia Pedraza-Bailey

blatant forms of discrimination that had existed in Cuba. Before the revolution, blacks were not allowed access to the restaurants and hotels in Havana, to the social clubs of the elite. The revolution did away with those forms of discrimination promising a society of perfect equality between blacks and whites. Certainly the position of blacks today is better than it was, but it is not perfect. Overt discrimination ended; racial prejudice did not. In attitudes, not a great deal of change has taken place. I have come to think the key lies in the difference between social movements and government policy. Women are also an example. In Cuba, there have been vast changes in the participation of

women in society, but the double-standard persists in the sexual ethic, and sexism (although affectionate) pervades the way men treat women. The revolution eradicated what could be eradicated by law, by social policy. But the expectation that with capitalism gone and communism here, we have destroyed the basis and therefore the consequences, that is false. Attitudes do not disappear by fiat. In the United States, we have the opposite problem. The women's movement achieved many attitudinal changes, but not many legislative changes. But at least among certain groups—middle-class, college-educated—there is a world of distance between the way we were and are. Both women

and men have made frank efforts to stop being sexist, to found their marriages on a more egalitarian moral basis. That is what a social movement does, because in a social movement people work not only on changing society, but also on changing themselves. Then you reach much more deeply inside. But we also need policy changes, legal changes. We have not achieved enough of those in the United States, for either women or minorities.

Hamada: What about education?

Pedraza-Bailey: Considering the meager old public education system in which for the most part the elite attended private schools and the rest were left with few public schools, Cuba's expansion of the public-school sector is downright impressive. Even poor people in remote rural areas have access to a free education and, ultimately, they can study at the University in Havana. The schools themselves are adequate and decent. The spread, linkages among levels, the opportunity: that is fine. What disturbed me came afterwards, when I asked to see the children's textbooks. They lent me a history book. On the first page I found Lenin and the October Revolution. As a Cuban, I feel deeply offended to think my history begins with Lenin and the October Revolution. It does not. It begins with the War of Independence and its heroes, Jose Martí and Antonio Maceo.

Hamada: Martí is often used as a symbol in Cuba. Is it not a two-edged sword to use Jose Martí? Because people are aware of what Jose Martí said.

Pedraza-Bailey: Jose Martí is, in one person, Lincoln, Washington, and Jefferson: emancipator, fighter, philosopher, thinker. They use Jose Martí as a symbol not only in Cuba; the Cuban community in the United States also incorporates his writings in everything that they do. I won-



dered how it was possible to use one person on both sides. Recently, I have come to understand the two sides of Martí's thought. He thought that Cuba had to achieve two essential things: one, to free itself from the colonial domination of the United States and of American forms of both political and economic intervention in Cuba and the other, to achieve the development of republic, constitution, democracy, and eradicate racial discrimination in Cuba. Both sides use him because each focuses on only one side of his legacy. Cuba emphasizes his desire to end American colonial domination; Cubans in this country stress his emphasis on democracy and republic. While we have achieved the first, we have yet to attain the second.

Hamada: Speaking of heroes, Castro has always presented himself as a charismatic deliverer of Cuba. What does that tell you about the politics of charisma?

Pedraza-Bailey: Charisma signifies the "gift of grace," the special personal powers a leader has that enable him to move people and carry them with him, so much so that they may not notice what is happening. That happened in Cuba. A young man in the military told me, "They began with the prostitutes." They said prostitution is evil, a crime; therefore, let us round up the prostitutes to rehabilitate them. Of course, no one was opposed. They began with categories of people whose passing no one objected to: the detested big landowners, the corrupt officials. But in the process they established that it was okay to collect some people, that they knew who was morally sound or tainted, that the path to rehabilitation goes through a prison. When they arrived at the little man, he realized that social control was also about him, but by then it was too late. The French

movie *Mr. Klein* makes that point. In France, during the Nazi occupation, there is a non-Jewish Mr. Klein who realizes that, in persecuting a Jewish Mr. Klein, the Nazis are following him. Finding traces of the Jewish Mr. Klein, who was selling his belongings to go into exile, he repeatedly explains to everyone, "But I am not that Mr. Klein." Always, our Mr. Klein thinks that it is not about him. At the end, he is on a train to Auschwitz, still explaining that he is not that Mr. Klein. Most of us are like that. When they are after the Jews, we insist, "But that's about the Jews, not about me." At some point it stops being about the Jews, and starts being about you also. But then they have consolidated control; it is too late. Charisma helps enormously in getting from the beginning to that point. Yet charisma alone does not achieve control. In Cuba, very early on, the old jury system was destroyed, the press shut down, social protest abolished, and collective bargaining ended when trade unions became only transmission belts for the party.

Hamada: Cuba's achievements, it is said, lie in health and education. Is the health system good?

Pedraza-Bailey: Yes, people have access to good, free health care. If a minor problem ails them, they go to a polyclinic; if the problem is bigger, to a small hospital in the nearest city; if it is serious, they are sent to Havana. Thanks to the thoroughness of inoculation campaigns, diseases like tuberculosis and polio have disappeared. That is real. But I would not want to trade it for the absence of liberty and dissent, which are also real. All societies should provide good health care for their citizens. In the United States, we have a long way to go to achieve social democracy. But one cannot substitute just health and education; one cannot say *this* is democracy when one cannot speak freely, participate with privacy, lead a life without scrutiny, or become a member of an opposition that has a voice.

Hamada: Are there lessons to be learned from Cuba?

Pedraza-Bailey: Several different lessons: For American foreign-policy makers, the futility of economic coercion. The embargo did not hurt the Cuban government; it practically starved the Cuban people. In addition, the Cuban government derived much legitimacy from it, insisting that all their problems—with consumption and distribution, food, housing, poverty—were products of the embargo. When, in 1979, Raul Castro announced "We cannot keep blaming the embargo for everything, as we have so often done in the past," he underscored its usefulness. Moreover, if sometime in the last two decades there were chances for the United States to have acted to promote a liberalization in Cuba, those opportunities were missed. Diplomatic solutions would have been better.

For young Americans, the end to that romance woven around Cuba. For many, the Cuban revolution served as a repository and a symbol of anti-American government feeling. That was very easy to do, because much damage was done to my generation: the Vietnam war, Watergate, a succession of events in this country that resulted in a serious erosion of public trust and public feeling. For many, that haze became focused on: Cuba is a wonderful thing. But Cuba is not, I am sorry.

For Cubans, both in the United States and in Cuba, a reevaluation of goals. To continue my analogy, after two bad marriages, to authoritarianism of the right and authoritarianism of the left, perhaps we can have another chance to grasp for a good marriage. A century ago, Martí explained its essence: the end of colonial domination, the consolidation of democracy and republic, and the eradication of racism and discrimination. Until, as Cubans, we learn the importance of this balance, we will continue to sweat our fevers, as Martí wrote.



WASHINGTON
UNIVERSITY
IN ST. LOUIS



**Washington
University**

**Annual Report
1981-1982**

Introduction

I have often needled Bill Danforth for saying every year that this is or was the best year of his chancellorship. And now, as chairman of the board, I am caught red-handed in the same emotion.

When I'd ask Bill to justify that remark, he'd look at me with that wonderful spreading smile, scratch his head, and say, "Well, I don't know, George..." and then go on to list the many achievements of students and faculty. And he'd convince me in the same way that this report will convince its readers.

It is unnecessary to reiterate the excellence represented here. An observation I heard often from members of our community involved with the Commission on the Future of Washington University was that perhaps the University's national preeminence was not fully appreciated in our own city. I suppose it is part of the "prophet in his own country" syndrome. Even those of us who are alumni and who have been involved with Washington University for a long time, are constantly, pleasantly surprised by the deeds of its doers.

But I am a businessman and a fund raiser. And I am most heartened when recognition of the University's excellence comes in terms of support, so let me cite the four professorships established during the 1981-82 year. Guido Weiss was appointed to the Elinor Anheuser Professorship of Mathematics, established in honor of the late Elinor Anheuser Storz; Robert Salisbury was appointed to the Sidney W. Souers Professorship of American Government, established by Mrs. Souers in memory of her late husband; Joseph J. Volpe became the A. Ernest and Jane G. Stein Professor of Developmental Neurology, a chair established by the Steins; and Philip Needleman was appointed to the new Alumni Professorship, endowed by alumni of the medical school. Those are tangible contributions to the wellbeing of future generations of world citizens.

Since University life is a reflection of all life, no year is without the loss of a good friend, as well as the gain of others. The death in March of Charles Allen Thomas, chairman of Monsanto Company and of this University's board, reminded us that one man's personal ethic can lift each enterprise he touches. Charlie Thomas was a scientist, a national leader, an industrial chief executive; but more than these, he was a gifted and sympathetic student of humanity. He brought to each task the desire and ability to understand its

uniqueness. And once he had discovered that, he shared it. So we come once again to my beginning. For many of us, Charlie Thomas helped us understand and appreciate the unique institution that is Washington University. And we strive to pass that insight along to others.

George H. Capps, Chairman
Board of Trustees



George H. Capps
Chairman
Board of Trustees

Highlights

The academic year 1981-82 will be especially remembered for three noteworthy and unusual happenings: the report on the Commission on the Future of Washington University, the establishment of new ties with industry and a \$45 million challenge grant from the Danforth Foundation.

The Commission on the Future of Washington University, established in 1979, submitted a comprehensive report to the Board of Trustees in December. Headed by W. L. Hadley Griffin, chairman of the board of Brown Group, Inc., and vice chairman of the board of the University, the work of the Commission was carried out by 270 distinguished community and national leaders who composed ten task forces which studied major activities of the institution. The report was both extensive and intensive. A total of 194 recommendations were made, over half of which have already been fully adopted. Many others, more long range, are either in process or under study. Following the report of the Commission, a committee chaired by Griffin and made up of the chairmen of the task forces developed a summary report which was subsequently adopted by the Board of Trustees. (See Comments by the Chancellor, page thirty.)

The signing of contracts with Mallinckrodt, Inc., having an effective date of September 1, 1981, and with Monsanto, having an effective date of July 1, 1982, broke new ground in relations between Washington University and industry and established patterns that may be helpful as other universities and corporations deal with similar issues. Both contracts established institution-to-institution ties with cooperative methods of allocating funds designed to support the goals of both parties while protecting their interests. (See the report by Dean King, page twenty, and the Comments by the Chancellor, page thirty.)

In January, the Danforth Foundation offered a \$45 million challenge grant to Washington University. This extraordinarily generous offering, following on the heels of a \$60 million challenge grant in 1973, provides Washington University with the opportunity to prepare itself financially for the decade ahead. In making the grant, the Danforth Foundation took into account the work of the task forces of the Commission on the Future of Washington University. In accepting the grant, the University trustees expressed gratitude for the high degree of

confidence that the foundation placed in Washington University. To qualify for the grant, the University must raise by December 30, 1987, matching contributions from private sources — \$3 for each \$1 offered by the foundation.

Even more important than these three noteworthy happenings is the day-to-day work of the University which underlies all special events.

In fall 1981 a record number of students, 4,561, enrolled in the undergraduate full-time divisions of Washington University. They came from fifty states and numerous foreign countries. The freshman class of 1,071 included 128 National Merit Scholars as well as many with significant academic and extracurricular accomplishments. For example, forty-five had been president of the senior class or student council and 154 had edited the high school yearbook or student newspaper. One returning undergraduate had a thirty-five year absence during which he became president of a bank. His purpose was to study Shakespeare and Shaw and complete a major in English.

The 121st Commencement was celebrated on May 20, 1982, in Brookings Quadrangle. Washington University granted degrees during the 1981-82 academic year to 2,565 women and men. The graduate and undergraduate degrees were almost evenly divided. Some of the graduates are already well on their way to making a mark on the scholarly community. Two will continue their studies in England supported by prestigious scholarships, a Rhodes and a Marshall.

During the year a number of awards and honors were received by the faculty and are included in reports of the deans. Among seventy-eight leading scholars, scientists, public figures and artists recently invited to membership in the American Academy of Arts and Sciences were Chancellor William H. Danforth and William H. Gass, David May Distinguished University Professor in the Humanities. Founded in 1780 by John Adams and other intellectual leaders of that day, the Academy includes fourteen members of the Washington University community. In 1981-82, the University's teacher-scientists received for research and scholarly activities \$71 million in awards for 594 projects, despite very intense competition for science funds. Recently, the National Science Foundation published the ranking of universities in receipt of federal research and development funds for fiscal year 1980.

The listing of private institutions shows that Washington University was number nine in the nation in the amount of funding received. It is one of the smallest universities in the first ten.

The University was honored during the year to receive a \$300,000 grant from the Henry Luce Foundation to establish a Henry R. Luce Professorship in Law and Liberty. The grant provides support for a five-year period, with possibility of an extension for an additional three years. This professorship is the centerpiece of a multidisciplinary undergraduate program in law and liberty that may be unique in the nation.

St. Louis theatregoers were the beneficiaries of a joint venture undertaken by the Opera Theatre of St. Louis and the University. December 22 through January 2, Gilbert and Sullivan's engaging nautical operetta, *H.M.S. Pinafore*, anchored on the stage of Edison Theatre, where it attracted a wide audience from throughout the community. This production of *Pinafore* was the first professional presentation of Gilbert and Sullivan in St. Louis for many years. It regularly played to a full house, to the delight of the 6,500 adults and children who attended the ten performances.

Mallinckrodt Center was expanded during the summer to make additional room available for student-related activities. The most significant change is an enlarged bookstore. The former three-floor space has given way to a new, more capacious two-floor operation. Text and trade books are on the main level, with supplies and sundries on the lower level. Other changes include expansion of the Deli, addition of a cashier's office and a travel agency on the third level of Mallinckrodt, and a new copy center.

The Gallery of Art is completing the first phase of renovations to Steinberg Hall. Improvements include introduction of sophisticated climate and lighting-control systems and provisions of a spacious, well-equipped classroom and research area.

The Washington University community is grateful for the fact that total giving received from private sources during the year came to \$57 million, making 1982 the largest gift year in the University's history, with the exception of 1977 when the Danforth Foundation Challenge Grant of 1973 was earned. The largest number of alumni ever, 17,285, contributed \$2.9 million exclusive of bequests. A record bequest of \$38 million came to Washington University from a trust fund established by the late Edward Mallinckrodt, Jr., in 1967. These assets have been added to the University's endowment; the income is used for scholarships and fellowships in the biomedical areas.

Faculty of Arts and Sciences

My annual report last year ended on a tentative note, first, because the work of the Arts and Sciences Task Force of The Commission on the Future of Washington University had not been completed and, second, because the incorporation of University College into the Faculty of Arts and Sciences, as a result of the administrative reorganization of Continuing Education, had yet to be consummated. It now is possible to report to friends and alumni, however, that both of these projects have been brought to conclusion.

The Task Force, ably led by George E. Pake as chairman and John F. McDonnell as vice-chairman, presented its report to the Board of Trustees on October 16, 1981. The report emphasized the centrality of the Arts and Sciences to the mission of the University and asserted, in view of this centrality, that the Arts and Sciences, had "no honorable choice but to opt for excellence" in its departments, programs, and activities. "Whatever the remainder of the century may hold for the higher learning," the report stated, "the Task Force believes that it holds a good deal more for those who deliberately choose to be excellent than for those who choose to be good..." Congruent with the goal of excellence, the Task Force made twenty-one specific recommendations distributed over six broad areas: organization and function, physical facilities, instruction and research, liberal education, the use and allocation of resources, and extramural relations. Implicit in the recommendations was a two-fold strategy for moving toward excellence. The first part summoned the Arts and Sciences to improve coordination among and within its programs and departments, to use its resources efficiently and deploy them effectively, to be selective in defining its academic mission, and to be vigorous in seeking targets of extramural opportunity. The second part was a summons to provision the Arts and Sciences with the resources consummate with an earnest thrust towards excellence.

Effective July 1, 1981, University College became the third school, after the College and the Graduate School, of the Arts and Sciences. Effective October 1, 1981, Professor Robert C. Williams was appointed Dean of University College. Besides a record of scholarly distinction, Dean Williams brought to the position considerable administrative experience acquired as chairperson of the Senate Council, chairperson of the Department of

History and director of the Master of Liberal Arts program in University College — a program which he founded and which has become a remarkably successful academic innovation. In many respects 1981-1982 has been a "shakedown" year for University College as Dean Williams has undertaken to reorganize thoroughly its administrative structure, reconstitute its staff and define its relations to other schools of the University which offer programs for adult and part-time study. There remain for the immediate future significant revisions in the curriculum, the development of suitable mechanisms of governance, and improving coordination between the activities of University College and those of the College and Graduate School.

A full listing of the honors and recognitions which came to students and faculty members in the Arts and Sciences during 1981-1982 would surpass the space allocated for this report. The following, therefore, merely are illustrative. For the second successive year and the third time in six years Washington University won the William Lowell Putnam Mathematical Competition. The University's team coached by Professors Carl Bender, Physics, and Edward Wilson, Mathematics, had as its members Kevin Keating, Richard Stong, and Edward Shpiz. In order of finish behind Washington University were teams from Princeton, Harvard, Stanford and 339 other colleges and universities in the United States and Canada. The announcement of the Rhodes Scholarship awards brought the news of Washington University's first woman recipient. She is Ellen Pint, who graduated in May with concentrations in economics and French. Pint is the third student in the College of Arts and Sciences in five years to be honored with a Rhodes Scholarship. Among members of the faculty, Professor George Johnson, Biology, was awarded a John Simon Guggenheim Fellowship and Professor Carl Wellman, Philosophy, received a fellowship for study at the National Center for the Humanities. Professor Wellman will join Distinguished Historian-in-Residence Jack Hexter, who will continue at the center for a second year as a Mellon Fellow. For his distinguished achievements in fiction-writing, Professor Stanley Elkin, English, was named to the American Academy and Institute of Arts and Letters, while New York University recognized Constance Urdang, director



Ralph E. Morrow
Dean
Faculty of
Arts and Sciences

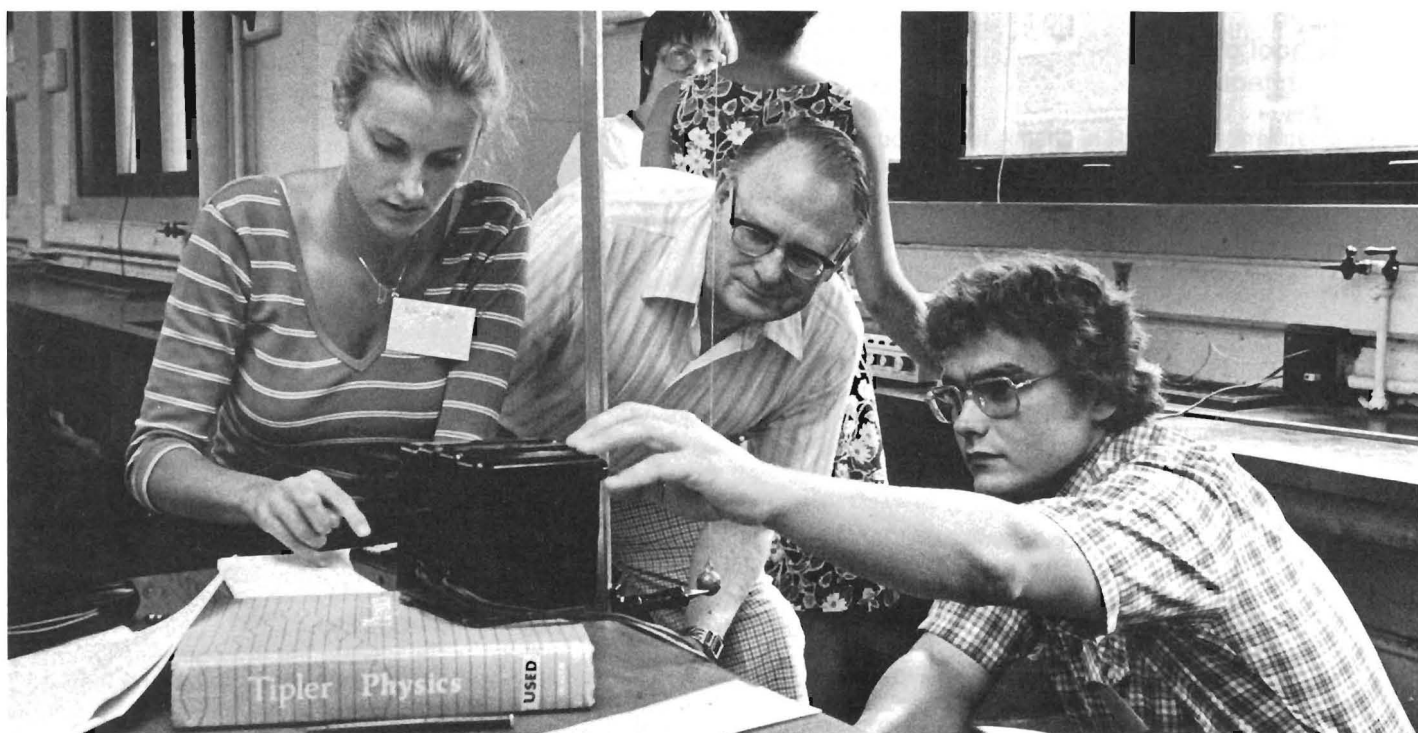
of the Writers Program, by the conferral of the Delmore Schwartz Memorial Poetry Award. Twice within a period of scarcely a month, national attention was drawn to the Department of Earth and Planetary Sciences as the result of faculty research into the geological history of the earth. Professor Klaus J. Schulz was one of a research group of three who announced the discovery of evidence linking the formation of the North American continent to the impact of a gigantic meteoroid aeons ago and Professor Raymond E. Arvidson, as an incident of his search for concentrations of ore, uncovered the existence of an ancient subterranean rift extending in a rough southeasterly diagonal from Omaha on the Missouri River to New Madrid on the Mississippi.

The College, under the capable stewardship of Dean Linda B. Salamon, exemplified the truth that the process of adapting programs, curricula, and requirements to changes in the academic environment sometimes takes the form of restoring the old as well as creating the new. Almost twelve years to the day after the faculty, with earnest support from students, voted to remove the mark of D from the grading system, it voted, again with the concurrence of the Council of Students of Arts and Sciences, to reinstitute the grade. Likewise, the Department of Music which sixteen years ago deactivated its professional degree, the Bachelor of Music, received the approval of the faculty to return the degree to active status. Cognizant of the demographic forces to reduce the size of the college-age population and in response to

evidences of growing interest among older persons, the College, with the encouragement and endorsement of the faculty, drafted policies applicable to the enrollment of part-time students. These policies, which are in line with those under development at comparable universities, have the aims of defining eligibility for part-time status, facilitating the matriculation of students who wish to study part-time, effectively monitoring their academic progress, and meaningfully integrating them into the academic community.

One of the serious but seldom remarked problems of the Arts and Sciences is that of maintaining stability and continuity in the administration of academic departments. The problem appeared particularly virulent during 1981-1982 when eight departments were affected by the resignations of their chairpersons. Fortunately, save for those in Biology and Education, all of the vacancies have been filled. The new chairpersons are: Patty Jo Watson in Anthropology, Mark Weil in Art and Archaeology, Richard Walter in History, Joseph Roach in Performing Arts, Lucius Barker in Political Science, and James Jones in Romance Languages. At the close of the year Dorothy Echols, Earth and Planetary Sciences, and Jarvis Thurston, English, were promoted to professors emeriti. Their combined service to Washington University exceeds half a century. Also at the close of the year the Faculty of Arts and Sciences lost a valued and esteemed member when Professor Franklin Haimo of the Department of Mathematics succumbed to the ravages of disease.

This report would be both errant and incomplete if, in addition to noticing the contributions of students, faculty, and administrators to the stature and enrichment of the Arts and Sciences it did not acknowledge those of alumni and friends. As the University will be strengthened by the challenge grant of \$45 million from the Danforth Foundation and by the accrual of the Mallinckrodt gift of \$38 million, so will the Arts and Sciences in several of its parts. The gift of Mrs. Sidney W. Souers in honor of her late husband made possible the announcement, in March, of the Sidney W. Souers Professorship of American Government and, a few weeks later, the bequest of Elinor Anheuser Storz was recognized by the establishment of the Elinor Anheuser Professorship of Mathematics. The first incumbent of the Souers Chair is Professor Robert Salisbury and of the Anheuser Chair, Professor Guido Weiss. It also is deserving of note that for the second successive year a challenge grant from the Joyce Foundation for undergraduate curriculum development and the improvement of teaching was matched as a result of a campaign headed by Michael Newmark, AB 60, JD 62, and that for the fourth year in succession, gifts by alumni surpassed the record of the preceding year. That independent universities, in general, and their Arts and Sciences divisions, in particular, will sail in difficult waters for the coming several years is a matter of common fame. Let the record also show that they sail with the generous support of their alumni and friends.



School of Architecture

Two major issues dominated our thinking during the latter part of 1981-82: the uncertain economy which, due to the strains placed on the architectural profession, poses potential problems such as reduced enrollment for the School, and the encouraging news of the Danforth Foundation's \$45 million challenge grant in which the School of Architecture is a recipient.

Published reports of limited job availability and moderate financial rewards in architecture, together with demographic realities (fewer eighteen-year-olds entering college) have weakened applications to freshman architecture classes nationwide. Although this year we experience a slightly reduced freshman-application pool, the quality of those applying was more than adequate to produce our class of fifty freshmen for fall 1982.



**Constantine E.
Michaelides
Dean
School of
Architecture**

The Danforth Foundation \$45 million challenge is obviously of utmost significance in helping the School implement the educational goals endorsed by the Architecture Task Force. It is perhaps appropriate to extract here from the report of the Commission on the Future of Washington University, submitted to the Board of Trustees in December, the specific recommendations and endorsements on Architecture:

1. The School of Architecture plays and will continue to play a vital role in the future of Washington University. Its proximity to the School of Fine Arts and the Gallery of Art in Steinberg Hall, all of which have similar goals, needs, concerns, and interests, provides a unique opportunity for Washington University to establish a Center for the Visual Arts.

*The Committee endorses the proposal for a Center for the Visual Arts and proposes consideration of a program to obtain funding for the construction of a new facility to support this Center.

2. The curricula program of the School was conceived to fulfill the long-range goal of quality professional preparation with emphasis on architectural design. The program continues to fulfill that goal.

*The Committee endorses the current program and the flexibility inherent in its structure.

*Further, the Committee endorses the School's using professional practitioners as affiliate part-time

faculty to teach in specialized areas.

3. The Committee believes that additional improvements in Givens Hall are needed in all studio areas, in the darkroom facilities, shop facilities, and other support locations.

*The Committee endorses the School's stated needs in these areas of physical facilities.

4. The School of Architecture at Washington University is the only professional program in architectural education in Missouri. Thus, the School has a special responsibility and commitment to the state. The School has suggested an approach to fulfill these needs and to provide quality professional architectural education for its interested residents.

*The Committee endorses the School's proposal that a contractual arrangement be made with the state of Missouri that would make available to qualified Missourians a number of positions in the final two years of the professional graduate program, and the Committee encourages the Board of Trustees to investigate its feasibility.

5. The Committee agrees that the School needs to keep in touch with the profession, with its alumni, and with companies that relate to the construction industry.

*The Committee endorses the School's willingness to expand its role in continuing education programs, especially in light of the probabilities of statewide relicensing legislation.

6. The School of Architecture should not be expected to graduate full-formed professionals. The required three years between graduation and the state board examinations is a period of internship for the young architect.

*The Committee endorses the School's aspirations for internship opportunities, in collaboration with the professional community, as an integral element of the School's approach to continuing education.

7. The Committee believes that the alumni of the School can and should be a vital element in an expanded recruiting effort.

*The Committee endorses the School's plans to expand the involvement of alumni in student-prospect recruitment.

8. The Committee believes that the bonds of common concern among the School and its alumni and friends within the professional community should be reinforced at every opportunity.

* The Committee endorses the plan of the School to invite an advisory committee to work with the dean and the administration of the School on matters of shared interest.

9. The Committee recognizes that many qualified students may not have the financial resources to permit enrollment at Washington University.

* The Committee endorses the School's initiative to establish an endowment fund for scholarships, which would enhance the ability to attract and retain the most outstanding students available.

10. The Committee believes that a measure of fiscal independence is inherently necessary if the School is to maintain the flexibility it needs to be responsive to its students, faculty, and alumni, and to the profession.

* The Committee endorses the School's goal of fiscal

independence, or "modified reserve status," as a unit within Washington University.

These recommendations are very welcome, and, I believe, consistent with the recent history, character, and academic development of the School. To the extent that they can be implemented, the programs of the School and the role of the School within the University will be enhanced. Realization of the recommendations will further reinforce the School's professional programs and commitments, underscoring its regional potential and responsibilities, and provide a more secure future financial basis by matching fiscal — with present academic — independence.

In November 1981, we celebrated the fiftieth anniversary of Givens Hall. More than 250 alumni and friends gathered for this three-day celebration to honor four former deans — Joseph D. Murphy, Buford L. Pickens, Joseph R. Passonneau, and George Anselevicius — and a professor, Leslie J. Laskey, who has taught at the School for twenty-five years. Other activities of the commemoration were Fumihiko Maki's lectures on "Functionalism Broadened" and "Reflections on Architecture"; an

exhibition of the work of Alvar Aalto organized by the Museum of Finnish Architecture; work of the sophomore class on the organization of the celebration and on the graphics and banners associated with it; and an exhibition entitled "Fifty Years of Givens Hall" based on text and photographs from the School's catalogs dating from 1913. In retrospect, it becomes evident that the construction of Givens Hall served to legitimize the presence of architecture as an academic discipline at Washington University.

The recently completed Task Force report and the promise of the Danforth Foundation challenge grant may prove to be equally important milestones.

The School of Architecture rarely makes headlines in *Student Life*. This spring it did twice! First to report on a curricular controversy; second to report a minor fire. The fire was quickly extinguished but the curricular issue still smolders. It relates to the studio classes offered early in the professional curriculum and asks whether 300-level students should be in a "core" studio by themselves. The subject has produced lively discussions in Givens Hall, which we welcome. We hope to see it resolved during the fall semester.

In the past year an impressive number of faculty and students received national recognition in architectural competitions. Professors Iain Fraser and Thomas L. Thomson with Thomas Fisher (MArch81) and David Dymecki (BA81) were finalists in the Eagle Ridge (Steamboat Springs, Colorado) Resort Community national competition. Richard Brown (BA80), Michael Dipasquale (MArch81), and Steven Bebee (BA82), through work in the studio conducted by Professor Janet Rothberg White, won awards in national competitions sponsored by the Society of American Registered Architects. Most recently, Zachary W. Davis (MArch82) won the prestigious \$12,000 William Van Alen Architect Memorial Fellowship through an international competition sponsored by the National Institute for Architectural Education in New York. The award will allow him to travel and study abroad for a year.

Alumni, parents, and friends again provided gratifying support. Four hundred forty-two alumni contributed \$51,039, a significant increase over the previous year. Memberships in special giving clubs include 121 members of the Architecture Century Club, seventeen Fellows of the Century Club, eight members of the Dean's Committee of the Century Club, and twenty members of the William Greenleaf Eliot Society.

We are looking forward to another good year!



School of Business and Public Administration

Interest in business education on the campuses of American colleges and universities has increased significantly in recent years. The total number of students graduating from business programs in 1980-81 was 253,395, compared to 144,173 in 1970-71.

This trend is evident today at Washington University and development of the Business School is regarded as a major priority for the University during the decade ahead. Enrollment in the School's undergraduate (BSBA) program is at a record level. Demand by undergraduates in Arts and Sciences and other divisions to take electives in business never has been higher. Applications for both the full-time and evening MBA programs continue to increase. Reflecting these factors, the Business School is expanding its faculty, staff, and other supporting services.

Described below are some of the important activities in the Business School during 1981-82:

The Business Task Force. The most far-reaching was the completion of the work of the twenty-seven member Business Task Force. During this thirteen-month project, a searching evaluation was made of the School's goals, present position, opportunities, and standing among the nation's leading business schools. The Task Force interpreted the School's objective to be to "attain sufficiently high quality in its teaching, research, and programs to attract the best students and faculty, and to earn the continuing respect and interest of alumni, contributors, and the University in general." The Task Force concluded that this objective, while very difficult to achieve, is attainable, and that having a Business School of this quality would be very beneficial for Washington University and the business community at large. The Task Force's overall recommendation was as follows: That having a nationally recognized business school be a top priority of Washington University for the 1980s; and that Washington University vigorously support the development of the resources needed immediately and longer term to attain this objective.

This recommendation has received wide acceptance. It is the beacon for all of the School's current actions and future planning.

BSBA Program. In 1972-73, the School began a comprehensive revitalization of the BSBA program to correct deficiencies which had led to severe enrollment declines during the 1960s. Course work in business and academic advising by the faculty of the School now begins in the freshmen year. The curriculum has been made more flexible to recognize the diverse paths which students working for the BSBA follow upon graduation and to accommodate those who want to pursue interests in the Arts and Sciences while studying business. Subsequent improvements have included programs to develop written communications skills, to allow the superior student to become a teaching assistant, and to enable BSBA students to apply their learning through business internships.

This revitalization has been completely successful. Enrollment in fall 1982 was 380 students. Applications for the freshmen class of 102 numbered 425, up 6.4 percent from a year ago. Even more important is the steadily increasing quality of the record of those applying for undergraduate admission. The present freshman class has a mean score on the Scholastic Aptitude Test of 1160, and 84 percent finished in the top 20 percent of their high school classes. Today, the BSBA program is again a thriving, integral part of the School.

Facilities. Prince Hall has served very well as the Business School's home since 1961. However, the School needs expanded facilities, since operations now have far outstripped the building's capacity. In March, the Board of Trustees authorized planning for expansion. A new building will be located immediately west of Prince Hall. A national competition was held to select the architect. Occupancy is expected sometime in fall 1984.

MBA Program. A top-drawer MBA program, which places its graduates with leading companies, is essential for the School to achieve the Task Force's recommendation. Three major strides were taken in 1981-82. First, several changes in the required curriculum were implemented. Second, progress was made in building the MBA student pool; the applicants for the 1982 entering full-time class of 123 students increased 15 percent from last year, allowing us to be even more selective in the men and women admitted.



Robert L. Virgil
Dean
School of Business
and Public
Administration

Third, the placement record for 1982 MBA graduates was the strongest in the School's history. At this writing, 82 percent of the ninety-six MBAs registered with the placement office had accepted positions. The mean starting salary was \$26,200, with a range of \$19,000-\$36,000. Those placed joined fifty-six companies throughout the U.S. That 55 percent of those placed located in St. Louis reflects the growing significance of St. Louis as a commercial center. This MBA placement record, enviable in any year, is especially notable given the condition of the American economy throughout 1982.

The Banking Institute. A chief reason for the strong placement record was the Institute of Banking and Financial Markets, directed by Jess B. Yawitz, the John E. Simon Professor of Finance. Formed in 1980, the Institute is attracting recognition throughout the financial community for its programs to bring leading professionals to campus, for the research it sponsors, and for the papers it disseminates. As a result, many leading financial institutions view the School as a principal source of new managerial talent. In 1981-82, fifty-six financial institutions interviewed our MBA and BSBA graduates. As this report goes to press, thirty-two MBAs and twenty-one BSBA graduates have accepted positions in commercial banking, investment banking, and brokerage firms. No business school has a stronger position than our school in banking and finance, which is an extremely important sector of the U.S. economy. By fall 1982, the Institute had grown to thirteen full members and thirteen associate members.

The Faculty. During 1981-82, the School's very able, dedicated faculty taught, counselled, and otherwise served 374 BSBA's, 216 full-time MBAs, 257 evening MBAs, five PhDs, and approximately 362 students from other divisions taking our courses. Once again, the faculty has responded with distinction to its demanding responsibilities.

Special recognition came to several faculty. Associate Professors William J. Marshall and Richard L. Oliver were granted tenure. The undergraduate students named Professor John W. Bowyer, Jr., and Assistant Professor Kenneth M. Lehn "teachers of the year" for 1981-82. The MBA students similarly honored Associate Professor James A. Anderson and Assistant Professor Gary W. Emery.

A most intensive year of faculty recruiting was completed with the appointment of five new full-time faculty members for 1982-83, in accounting, business policy, quantitative analysis, business economics, and production management. In addition, five visiting

members will join our 1981-82 faculty. Arrangements were completed in June for Nicholas Dopuch of the University of Chicago, one of the foremost academicians in accounting and since 1968 editor of the *Journal of Accounting Research*, to join the faculty in 1983-84.

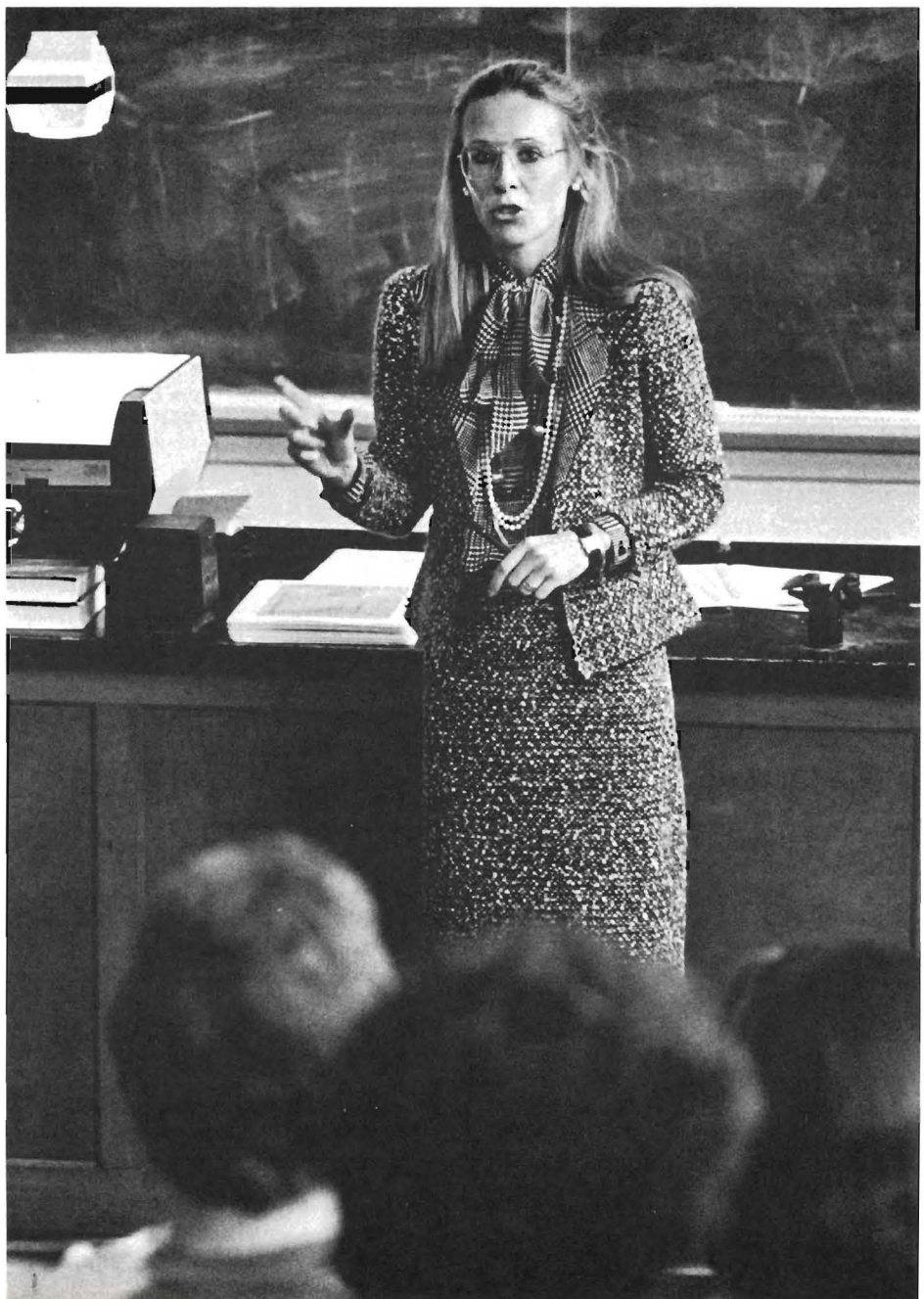
Development, Finances, and Alumni Relations. It is a reality of private higher education that as the quality of the academic unit rises, operating costs increase rapidly. However, the benefits produced do not always yield additional revenues. Thus, there is increased pressure to develop funds from external sources to maintain financial viability.

This situation characterizes the Business School today. Gratifyingly, though, our alumni, parents, corporate supporters, and other friends have responded generously. Consequently, for the third consecutive year since becoming an autonomous financial unit within Washington University, the School

had a balanced budget. Total giving to the annual fund from all sources was \$418,490. In 1979-80, the first year as a reserve school, total giving to the annual fund was \$262,976.

Alumni set records in all major categories in 1981-82. Alumni annual giving was \$236,928, versus \$187,160 in 1980-81. The ambitious target of 31 percent participation in annual giving by the School's 6,731 alumni was exceeded. Century Club membership topped 1,000 for the first time. The School's 152 total Eliot Society members and thirty-three new Eliot members both were the highest in the University. The Scholars in Business program, supported by alumni and friends, has 77 scholarships in force.

I wish to express my deepest appreciation to the faculty, students, staff, alumni, and other friends of the Business School. Our progress in 1981-82 was the result of their efforts and dedication.



School of Dental Medicine

The stringent limitations imposed by national and world economic problems provide an imposing challenge to educators today: to maintain quality, plan creatively for the future, and make needed improvements, yet remain within the constricted budgets mandated by an unsettled economy. The School of Dental Medicine is devoting all of its administrative energy to meet this challenge. In spite of the difficult days faced by each of us — institutions and individuals alike — the School is stable, holding its own, and confident of its future.

Our determination to enroll the best possible students from all parts of the nation and from foreign countries has led to institution of a new student recruiting program, which already shows signs of being very productive. Contacts with predoctoral advisors at many colleges and universities have been intensified and new contacts are being made constantly. Alumni are central in the recruitment program; many are assisting us as regional representatives. They will interview prospective students and will help persuade those qualified that our School and the St. Louis area offer an attractive environment in which to pursue a professional education.

The financial support of our alumni and friends continues to be of vital import to us in these days of inflation and high interest rates. We are encouraged by and appreciative of the support given in the past fiscal year, in spite of a not-unexpected downturn. Recent records show that more than 700 of our alumni contributed almost \$110,000, while an additional 133 friends gave almost \$30,000.

Alumni giving fell about 15 percent from the previous year. Two factors contributed to this: the nation's depressed economy and the absence from October to April of a director of development. With that post capably filled and with tenuous signs of an economic upturn, we are hopeful of much improvement. Despite the decline we are proud to report that more than 32 percent of our alumni contributed to the School, and this was again the highest percentage among alumni groups within Washington University. The loyalty and commitment of our alumni has been and continues to be our shining light.

We were heartened and gratified by the recent establishment of two major memorial student-loan funds. These greatly helped to alleviate the fierce financial pressures on our

students. Jeanette Musgrave of Springfield, Missouri, has established the Dr. Edward F. Musgrave Student Loan Fund in memory of her husband, a 1910 graduate of our School. Anna M. Wilson of Western Springs, Illinois, has established the Dr. Alan E. Wilson Student Loan Fund in memory of her son, who graduated in 1956.

We are developing plans for participation in the University's forthcoming capital-funds campaign and look forward to a healthy and generous response to that campaign, a response that will help us resolve the critical issues that will face society and our School in the next decade.

For several years we have participated with the University's Mallinckrodt Institute of Radiology in planning for development of the old A & P bakery building, eastwardly adjacent to the School. Associate Dean David A. Bensinger, who worked on physical planning with representatives of Mallinckrodt Institute and with the architects and who has conducted the equally important fiscal feasibility studies, has recommended that we delay a final decision on our School's use of this space. The projected costs of the development are higher than anticipated, and the School faces a material reduction in income if the suggested decrease in enrollment is effected. As Mallinckrodt Institute proceeds, the School will retain a five-year option, with provisions for extension, on the improvement and utilization of 18,000 square feet of this space. Our decision, with its vast financial implications, will be deferred until economic conditions become more settled.

Meanwhile, needed improvements in our School's present facilities are being made and will continue. We recently have completed work on new laboratories on the third floor of our Carlyn H. Wohl Research Center for research in osteobiology. A new tissue lab on the fourth floor of the Wohl building has been constructed for research being conducted in conjunction with scientists from The Jewish Hospital of St. Louis by Dr. Marilyn Dybvig, assistant professor of periodontics.

Our full-time faculty has been sharply increased in strength and quality in recent years and was further bolstered last year with the addition of twelve new members. An equal number was added to the ranks of our dedicated part-time faculty. Now numbering almost sixty members, our full-time faculty is in good balance with the roster of more than a



George D. Selfridge
Dean
School of Dental
Medicine

hundred part-time teachers. Both qualitatively and quantitatively we consider our strong faculty the equal of any dental faculty in the nation.

One recent addition and one imminent addition are worthy of special mention: Abdul H. L. Shawkat, D.D.S., associate professor of oral diagnosis and radiology and a board-certified oral radiologist, has come to us from the University of Louisville dental school, where he headed the oral radiology section for ten years. Charles A. Waldron, former Dean of Emory University dental school and a faculty member at our School some years ago, will return soon as our oral pathologist and also will have administrative duties.

A source of great pride to us has been the development of our department of continuing education, which throughout the year presents one- and two-day courses for dentists and dental auxiliary personnel. Last year, this department had the finest year in its history, with a record-high enrollment and accolades from participants. Our continuing education program has been formally approved recently by the new National Committee on Continuing Dental Education of the American Dental Association as a sponsor of continuing dental education courses.

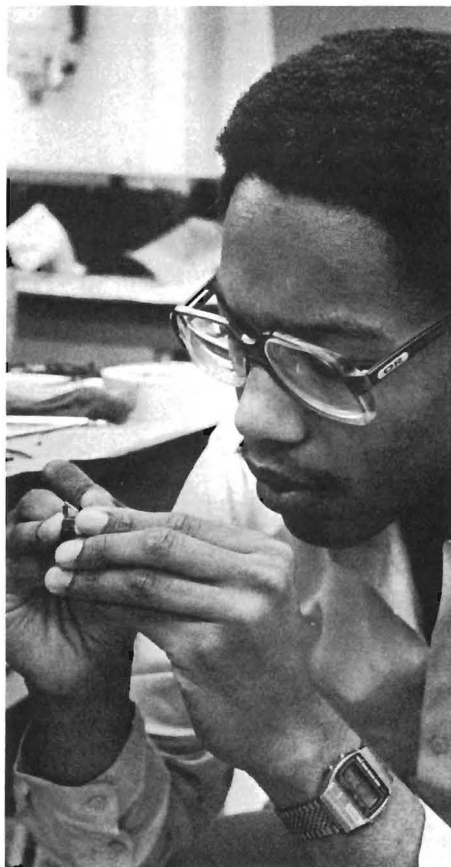
A sweeping reevaluation and reorganization of the functioning of our clinics, particularly from a business management viewpoint, has been undertaken. We have added a manager of clinical services who is supervising and

renovating the clinics' business management functions and will plan the computerization of clinic records and services. Clinical services are being coordinated on an interim basis by two senior faculty chairpersons, pending the appointment of a new administrator to oversee the health-care services provided.

Our Dental Alumni Association has decided that every few years it will take its annual meeting, customarily held in St. Louis, to a different part of the country as a service to distant alumni. It is planning a fine alumni trip to California, April 24 - May 1, 1983. After a few days in the Carmel-Monterey area, the group will move to San Francisco for the formal alumni meeting. Continuing education courses will be provided in both locations. We anticipate that many alumni from the Midwest and East will join this trip for what promises to be a gala reunion with alumni from the Far West and the Rocky Mountain states.

In order not to overlook the needs of our many alumni in Missouri and contiguous states, an alumni gathering also will be held April 14-15, 1983, in St. Louis. It will include the Century Club cocktail party, a luncheon, and class reunions for those anniversary graduates who cannot attend the reunions in California.

The alumni of the School's postdoctoral program in orthodontics formed their own alumni organization last year. They held a highly successful meeting in St. Louis and now are preparing for one this fall.



School of Engineering and Applied Science

During the 1981-82 academic year the School of Engineering and Applied Science granted sixteen doctor of science degrees, 107 master of science degrees, 252 bachelor of science (engineering) degrees to regular undergraduate engineering students, and thirty-three baccalaureate degrees to students in its evening programs in engineering technology.

Students earning the B.S. (engineering) degree came from forty-one states and eight foreign countries. Some 18 percent were women. Minorities (Asian Americans, Spanish-surnamed Americans, and black Americans) composed 9 percent of the graduating class. Thirty-three of the graduates simultaneously earned two degrees at Washington University. Roughly 70 percent of the graduating class started at the Washington University School of Engineering as freshmen; 15 percent came here after three years at a liberal arts college as students in the Three-Two program that the School operates in association with some one hundred private liberal arts colleges. These Three-Two students also received a bachelor of arts degree from their liberal arts college.

Approximately 25 percent of the graduates majored in electrical engineering and 25 percent in chemical engineering. Computer science and mechanical engineering each contributed 14 percent to the class. Civil engineering and systems science each accounted for about 9 percent, with the remaining graduates being divided between physics and technology and human affairs.

Last spring there was on the national level a noticeable softening of the job market for engineering graduates. Many companies curtailed recruiting activities and made fewer offers in expectation of having a higher acceptance rate. Although these events affected our students, in the context of the national economic distress, the Washington University engineering graduates fared exceptionally well. Average starting salaries were in the range of \$25,000 to \$27,000; and it appears that all graduating students seeking industrial positions have now been placed.

Undergraduate enrollment in the School remains at the upper limit of our capacity, which is approximately 1,000

undergraduate students. We have no plans to increase undergraduate enrollment, as this would require capital expenditures and staff expansions beyond our means. The School will continue to stress the quality of its undergraduate programs and continue to seek exceptionally capable baccalaureate students. At the graduate level, the School still has available capacity and additional enrollments, particularly doctoral students, will be sought.

This year the School of Engineering graduated its first class in engineering technology. This program was for many years administered by the University College division (the evening school) of Washington University. As part of a major administrative restructuring of all evening school work, the School of Engineering was asked to assume administrative responsibility for this program in the 1981-82 academic year.

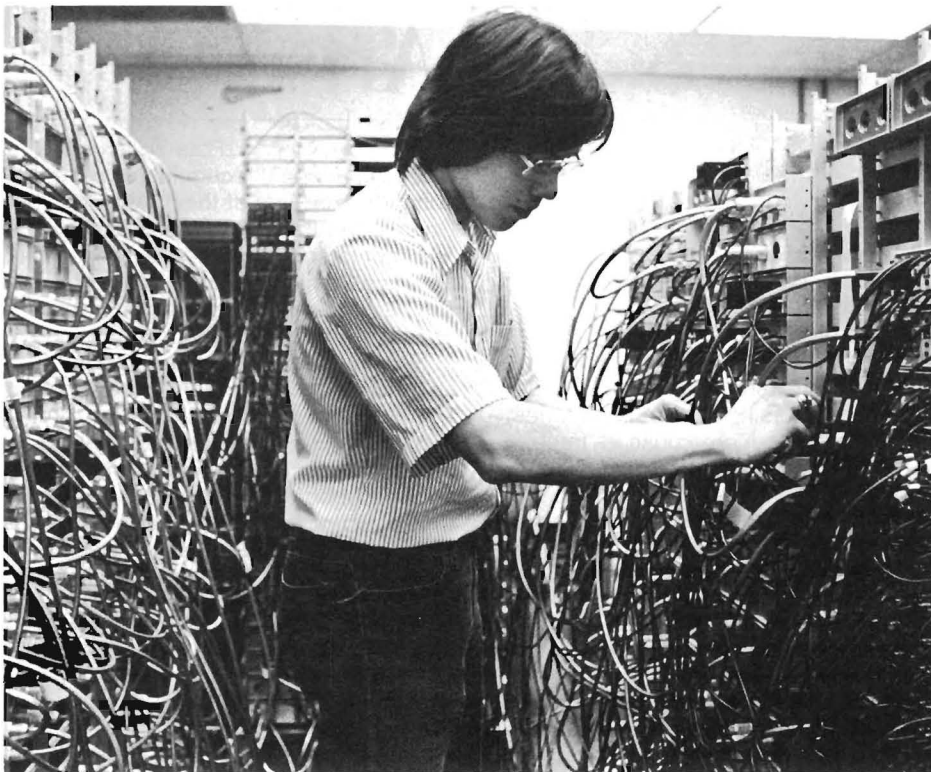
Engineering technology students pursue their education on a part-time basis in the evening. Most instruction is by adjunct faculty drawn from local industry. Students can earn a certificate upon completion of sixty units of work and a baccalaureate degree upon completion of 120 units. The Bachelor of Technology is not an engineering degree and students who earn the degree are not eligible to seek registration as professional engineers in the state of Missouri.

On the national scene, engineering technology is a rapidly growing field. Engineering technologists have found ready acceptance in many industries, particularly in design-oriented industries and in the electronics field. They seem to fill an essential role that lies between the technician and the professional engineer. The School of Engineering has tentatively accepted responsibility for these programs and during the coming year will develop administrative and academic procedures for their operation.

There are two main entry points for undergraduate students to the School of Engineering. Freshmen can enter directly from high school. Three-Two students, who have completed three years at an associated liberal arts college, can enter at the junior year. Freshmen recruiting is the primary responsibility of Assistant Dean W. L. Marsden, who is director of engineering student services, and Susan Felps, assistant director. The Three-Two program is directed by Assistant Dean



James M. McKelvey
Dean
School of Engineering
and Applied Science



Franklin Johnson, who is responsible for Three-Two student admissions.

The School of Engineering has space for about 200 new freshmen each year and about fifty Three-Two students. The selection of these students from a pool of approximately 1,100 freshmen applicants is a matter of vital concern to the School. We seek students having a combination of high academic ability and the high motivation needed to undertake and succeed at a demanding course of study. Financial aid is the primary constraint in student recruitment. Approximately half of all undergraduate students must receive financial assistance in order to attend Washington University.

The results of the 1981-82 recruiting season were excellent. The target enrollment figures (200 freshmen and fifty Three-Two program students) were met. More significantly, the academic ability of these students is outstanding. In the freshman class are thirty-two high school valedictorians. Some 50 percent of the class has SAT math scores greater than 700. These students are well motivated and have great potential for long-term success in their careers.

During the past few years the advent of microprocessor-based computer technology is having a major impact on engineering education. Engineering practice is becoming increasingly tied to the use of computers in design, analysis, and management. The engineering faculty, recognizing the importance of computers to engineering

students, has assigned a high priority to providing sufficient instruction in computer science and computing that all students will be able to utilize effectively the tools available to them upon entry into professional practice.

This past year, after recommendation by a blue-ribbon committee, the School of Engineering established a new organization, the Center for Engineering Computing, located in Lopata Hall, and under the directorship of Jeffrey Posdamer, Ph.D. The Center is to promote and support engineering computing, particularly interactive computing, computer graphics, and CAD/CAM.

The center is responsible for developing engineering computing resources to be shared by all departments. These include graphics software, intelligent work stations, microcomputer software, and the support of a high-performance graphics laboratory. The Center is responsible for encouraging the use of computing in the various departmental curricula, for the presentations of faculty seminars and workshops, and for systems consulting.

During the current year, beginning courses in computer science and programming will be taught using the PASCAL language and IBM personal computers. In addition, advanced engineering students will have access to a DEC-20 computer maintained by the School of Engineering, as well to IBM mainframe computers through interactive terminals. The overall goal of the Center for the next few years is to

increase greatly the use of computers in all engineering curricula.

One of the emerging areas of technology that will become increasingly important is biotechnology. While molecular biology and recombinant DNA research have received a great deal of public attention, another area of biotechnology must be considered as biological processes are scaled up for industrial production. This area is sometimes called biochemical engineering. Thus far, this area has had a very limited academic development, but the School of Engineering is committed to establish a major position for itself in the field. Such a development would, of course, complement the commanding position in the basic biomedical sciences enjoyed by Washington University because of its outstanding people in these areas.

The School has appointed Eric Dunlop, Ph.D., to the chemical engineering faculty to provide leadership in biochemical engineering. Dunlop is from the United Kingdom where he was involved in biochemical engineering research for Imperial Chemical Industries. Working in cooperation with Professor Phillips of the Department of Chemistry and Professor Silver of the Department of Biology, Dunlop will have an important role in developing an interschool activity devoted to biotechnology.

Extensive renovations to Cupples II, one of the original 1904 buildings of Washington University, is now in the final stages. Cupples II has new windows, a restored roof, and many architectural improvements to its interior spaces. At its east end, Cupples II is joined to Lopata Hall on three levels. Four of the five engineering buildings (Sever, Urbauer, Lopata and Cupples II) are now interconnected. Future plans call for connecting Bryan Hall to Cupples II with a bridge and to adding a fifth level to Lopata Hall to connect directly to the attic level of Cupples II, which has, with the building renovation, become usable space.

The 1981-82 academic year was particularly gratifying in that gifts to the School of Engineering for budget support rose substantially over the previous year. Close to one-half million dollars in gifts was applied to budget support. In addition, support for scholarships continued to rise. The number of Engineers' Scholarships rose to more than a hundred, and we anticipate continuing growth. The financial position of the School continues to be strong. Major grants announced during the year included the Danforth Foundation Challenge Grant of \$3 million for the engineering endowment. The grant will increase the endowment to approximately \$15 million.

School of Fine Arts

For more than a century, the mission of the School of Fine Arts has been to provide a professional education to talented and intelligent student-artists who aspire to lives and careers in the visual arts. We continue in that mission, providing the unique opportunity for superior professional training in the visual arts combined with superior academic experiences. We assert that the study of art has no natural boundaries; that every human enterprise — intellectual, technological, or social — can at some point become a part of the craft, content, or commitment of an artist.

The School of Fine Arts recently completed two separate self-studies, one in response to the Commission on the Future of Washington University, the other for the Coordinating Board for Higher Education in Missouri, which conducted an evaluation of the visual arts in the St. Louis area. Review groups for both projects endorsed our goals: 1) to provide our students with an intellectual foundation for concepts and skills in the visual arts while cultivating a commitment to the work of a professional artist; 2) to provide our students with the opportunity for a general education in the arts and sciences, preparing them for responsible life in the community; 3) to offer to certain students from other parts of the University an opportunity to learn the basic concepts and to have skill-building experiences in the visual arts, thus encouraging visual literacy and sensitivity among an educated public; and 4) to make available whenever possible new modes of educational experiences for a nontraditional student clientele from the greater St. Louis community.

A factor impossible to ignore by close association with Washington University is that each year seems more extraordinary than the last. Each new class of freshmen is bright and enthusiastic, faculty accomplishments and commitment appear limitless and unyielding, and our alumni contributions to society mount at an astonishing and noteworthy rate. Life at the School during 1981-82 has indeed been intense and rewarding.

Three of the freshmen who entered fall '82 were among only twenty-nine students nationally identified by a talent search conducted by the National Foundation for Advancement in the Arts, which came into being in October 1981. In addition, Ann Lofquist of Bethesda, Maryland, and Mark Wilkins of Reston, Virginia, were two of only four of twenty-nine students designated Presidential

Scholars in the Arts. Four undergraduates won national recognition for various competitions. One of them, Alyson Green, of El Paso, Texas, received one of five scholarships awarded by the Package Design Council of New York City. Green is the only awardee not enrolled in an independent college of art in New York City ever to have been so recognized.

Sculptor of commissions for fountain memorials, garden pieces, churches, and honorary commemorative medals and teacher of sculpture at Washington University for thirty-five years, H. Richard Duhme, Jr., became professor emeritus in July. Looking at a life-sized figure of an aviator or a famous educator in Professor Duhme's studio, one finds it hard to believe that they are created out of wire, styrofoam, and reusable plasteline, but easy to understand that retirement to his studio will not find a lessening of the energy expressed by his talent and long service.

Professor Richard H. Brunell who has been friend, father, and teacher to every student he has known and nurtured for more years than is polite to recount, also has retired from the ranks of full-time teaching. Professor Brunell, a consummate professional in his field, has been first a truly great teacher.

With the passage of the torch by Professors Duhme and Brunell and by Professors Arthur Osver and William Fett whose retirements occurred July, 1981, and through a system of three-year rotational appointments initiated at the School five years ago, several important personnel changes have been effected. Internationally prominent painter James McGarrell, a visitor for 1981-82, has become professor of art with tenure, effective July 1. New faculty greeting students at the School for the first time on September 2, 1982, included painter Susan Moore, figure sculptor Gyuri Hollosy, photographer Stanley Strembecki, and sculptor Alexis Wreden who accepted a 3-D design teaching assignment. We are particularly pleased that Professor McGarrell has attracted substantial numbers of top-quality graduate painting students who are in place at our Tyson graduate studios.

Sound management at Washington University and at the School of Fine Arts has significantly improved our situation within the University's central fiscal organization. An effective admissions program maintains the enrollment of the student body. Tuition paid by students is the primary source of income for the



Roger I. DesRosiers
Dean
School of Fine Arts

general operation of the School. Income from gifts and grants, generally from private sources, is the second most important source of income. Our outreach program has extended our role into the community and resulted in new income through annual giving. An application to the National Endowment for the Arts Challenge Grant program and the School's participation in the Danforth Foundation Challenge Grant are providing an important incentive to us to expand and diversify the sources of gift and grant income for a more rapid rate of growth.

Planning for the coming five years does not include the addition of new programs. Rather, our commitment is to maintain the curricula and programs of outstanding quality that we currently enjoy and share with our students, the rest of the University, and the St. Louis community. We believe that we will best serve the interest of our students and best use the investments of our benefactors by maintaining the quality to fulfill our current goals, consistent with our mission and limited resources.



School of Law

The School of Law Task Force, a division of the Commission on the Future of Washington University, found the School of Law to be strong and healthy. The Task Force concluded that the School's rapid growth over the past two decades "has been accompanied by a marked increase in the quality of legal education offered" and that the School "had improved its national image and reputation dramatically." The School, now fully national, draws students in substantial numbers from all parts of the country and sends its graduates to all sections.

Faculty and Faculty Activities.

Person-for-person, the members of the faculty are as productive of scholarly writing as any law faculty in the country. Professor Edward J. Imwinkelried has authored three books in the last twelve months, namely, *Evidentiary Foundations*, a second edition of *Scientific and Expert Evidence*, and *Handbook for the Trial of Contract Law Suits: Strategies and Techniques*. Professor Daniel R. Mandelker, keeping up a fast writing pace, has published several books during the last two years. Professor Frank W. Miller has published a new edition of one of his nationally recognized casebooks and supplements to the others. Professor A. Peter Mutharika has authored two volumes titled *The Alien Under American Law*. Associate Dean Philip Shelton has edited a second edition of the *Prelaw Handbook: An Official Guide to ABA-Approved Law Schools*. Other books in process are being written or edited by Professors Gary Boren, Kathleen F. Brickey, and Bernard D. Reams, Jr. In addition to recent books, members of the faculty have published articles during the last year in numerous legal journals.

D. Bruce LaPierre and Charles R. McManis were promoted from associate professor to professor at the end of the academic year. These promotions were based on outstanding teaching and extensive and high-quality writing.

An addition to the faculty is Stephen H. Legomsky, who holds a B.S. degree from Worcester Polytechnic Institute and a J.D. degree from the University of San Diego, where he ranked first in his class and was notes and comments editor of *San Diego Law Review*. He served as law clerk in the United States Court of Appeals, Ninth Circuit, and later as a division chief of the Central Legal Staff. This year he is completing the requirements for a Ph.D. degree from Oxford University.

Robert Goodwin, who holds an A.B. degree from the University of Missouri in Columbia and a J.D. degree from Washington University, has recently joined the faculty of the School's clinic. From 1980 to 1982, he served as managing attorney of Legal Services of Eastern Missouri. His community activities include service as president of the board of directors of the National Juvenile Law Center.

Professor Richard H. Helmholz has accepted an appointment at the University of Chicago, and Assistant Professor D. Kelly Weisberg has joined the University of California in San Francisco (Hastings). We shall greatly miss them.

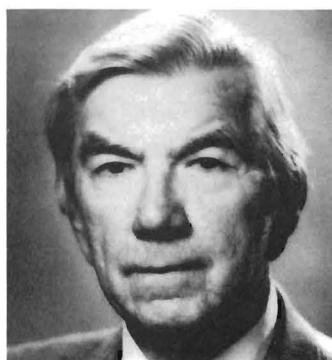
Robert W. Hamilton, Benno C. Schmidt Professor of the University of Texas School of Law, served as the first John S. Lehmann Distinguished Visiting Professor during the spring. He is author of a leading casebook on corporations and heads an American Bar Foundation project to revise the *Model Business Corporation Act Annotated*. He recently published *Corporations in a Nutshell*.

The John S. Lehmann Distinguished Visiting Professor for the fall semester 1982-83, Professor Frank J. Trelease, perhaps the nation's outstanding authority on water law and natural resources law, holds A.B. and LL.B. degrees from the University of Colorado and the J.S.D. degree from the University of Wisconsin.

New Academic Programs and Special Lectures.

One of the most successful recent innovations in the School's educational program has been a trial techniques course which utilizes team teaching by a full-time faculty member and a number of distinguished trial lawyers. The full-time faculty member plans the course and is responsible for assignments, general instruction, the showing of video tapes, and assigning grades. For a two-and-one-half-hour period each week the class is divided into small groups of ten or twelve students, and a distinguished member of the St. Louis Metropolitan Bar critiques students' performance in each of the groups. I am gratified that we have found this way of capitalizing on the tremendous talent and experience in the practicing bar.

Another innovation is a judges' demonstration/lecture series. This series, designed primarily for first-year students, is titled "The Anatomy of a Lawsuit." Over the course of a semester, law teachers, practicing lawyers, and drama students "act out" a lawsuit from



F. Hodge O'Neal
Dean
School of Law

the time a client comes into a lawyer's office until the suit is terminated on appeal. In each session, a state or federal judge discusses the lawyers' handling of the case. This series (1) provides the students at a very early stage with training in practical lawyering skills, without detracting from traditional first-year training in theory and analysis, and (2) gives students, many of whom have never been inside a courtroom, an understanding of how appellate opinions they study in their casebooks come into being.

Distinguished jurists and lawyers visiting the School during the year included: Judge Irving R. Kaufman, U.S. Court of Appeals, Second Circuit, who delivered the Tyrrell Williams Lecture; a three-judge panel of the U.S. Court of Appeals, which heard oral arguments at the School; Donald McHenry, former United States Ambassador to the United Nations; James Neal, nationally known trial lawyer; Harold Kline, formerly general counsel of Texas Gulf Sulphur Company; Jerome Cohen, former Harvard teacher and an expert on Chinese law; Edmund Kitch, professor of law and economics at University of Chicago; Jeffrey Smith, author of *Avoiding Legal Malpractice*; Professor Harry Jones, a 1934 alumnus of this School and professor emeritus at Columbia University School of Law; David Kirp, professor of the Graduate School of Public Policy at the University of California; and Donald Gallop, class of 1959, who was selected for honorary membership in the Order of Coif and delivered a lecture to student initiates.

Alumni Relations. Those of us at the School are trying hard to become

better acquainted with graduates and to strengthen ties with them. School representatives have visited alumni in Chicago, New York, Denver, Miami, Minneapolis, Washington, D.C., Belleville and Springfield, Illinois, and Kansas City, Springfield, Jefferson City, Sedalia, Cuba, and Lebanon, Missouri. Receptions for the School's graduates are now held at American Bar Association annual meetings.

Recipients of distinguished alumni awards were retiring Judge Harry L.C. Weier, class of 1936, and W.L. Hadley Griffin, class of 1947. The new president of the Law Alumni Association is Donald Paule, class of 1966. The association is encouraging alumni outside St. Louis to establish satellite organizations. The School now has graduates in substantial numbers in several areas, e.g., about 225 in Chicago and almost 200 in Washington, D.C. Chicago alumni are already organizing.

Gifts from Alumni and Friends.

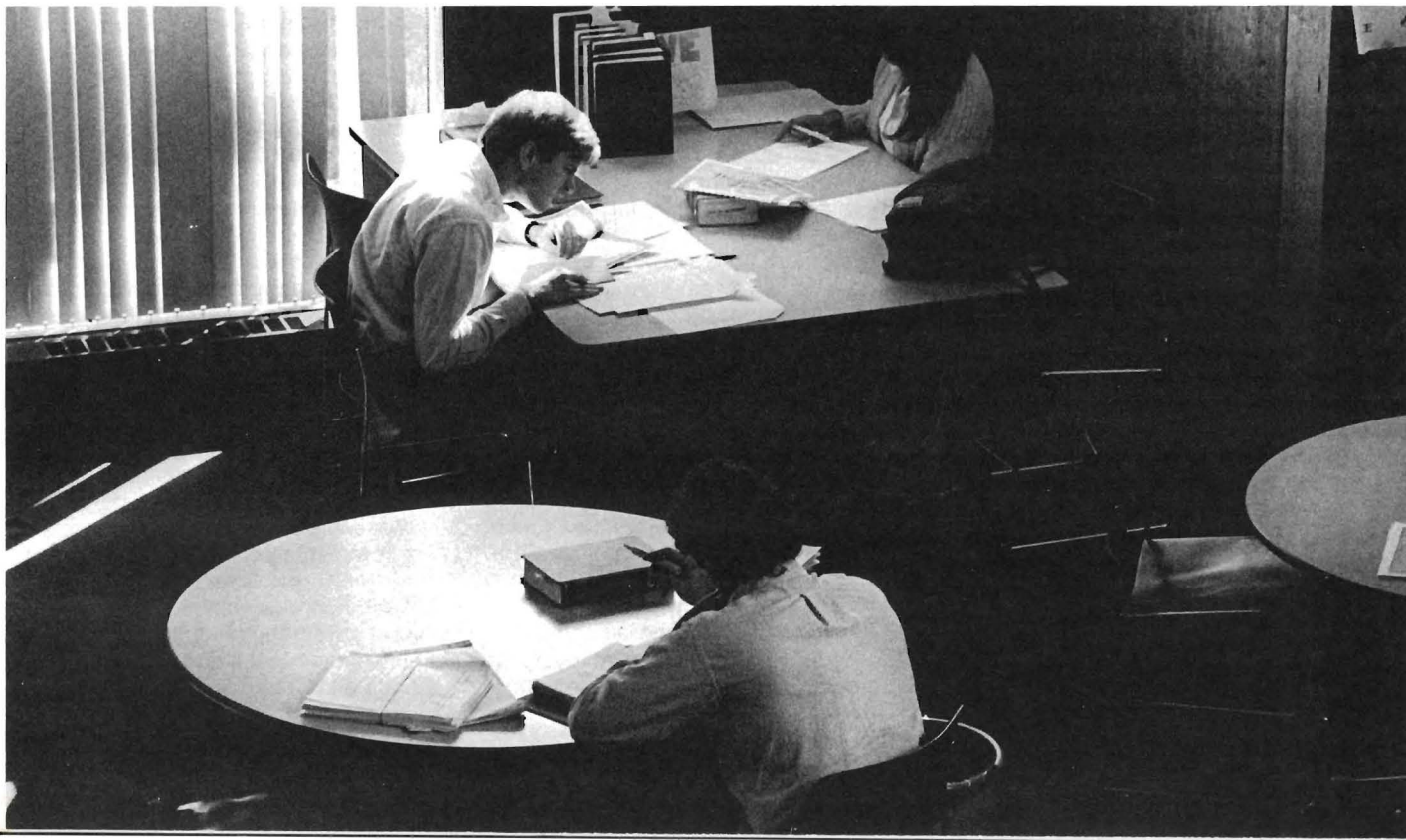
Gifts during 1981-82 broke records. The annual fund received \$164,464.45 from 1,264 donors, compared with \$143,925.54 from 1,148 donors in 1980-81. Seventeen new law members joined the Eliot Society, nine the Dean's Committee, sixteen the Fellows, and eighty-eight the Century Club. These results are especially impressive as substantial amounts were given during the year for special projects. For example, \$100,000 has been given or pledged to renovate the School's entrance and lounge. The largest single donor was Ullus Gudder, class of 1926, whose generous gift is enabling the School to renovate the upper lounge and convert it into an attractive refreshment area for alumni

and students. Other special gifts include one of \$25,000 by Anne Lehmann, adding to a visiting professorship fund, and a reunion gift of \$11,000 by the Class of 1932.

The School has launched a Scholars-in-Law campaign to provide scholarships for unusually talented students. A gift of \$80,000 in memory of Gerald K. Presberg, class of 1938, was the initial contribution to that fund. Further, at the initiative of the faculty, a loan fund is being established in memory of Professor Arthur Allen Leff, who taught here from 1965 to 1970.

Students. A class of 222 students, selected from 1,400 applicants, entered in fall 1981. The median grade point average was 3.3, compared with 3.27 for the class entering in 1980, and the median LSAT score was 625, compared with 612 for the 1980 class, a significant increase of thirteen points. Student recruiting has benefited from the leadership of Associate Dean Philip Shelton, director of the national LSAT Council and editor of the *Prelaw Handbook*.

Student achievements during 1981-82 were impressive. The student-operated professional journals — *Washington University Law Quarterly* and *Urban Law Annual* ("Washington University Journal of Urban and Contemporary Law") — published outstanding issues. Moot court and mock trial teams continued their successes of past years in regional and national competitions. Especially noteworthy was the winning of the Best Brief Award in the National Moot Court Competition.



Washington University Libraries

This was a very good year for the libraries of Washington University and it is manifested by the successful completion of several noteworthy improvements along with the achievement of some significant objectives. The libraries continued to develop in stature as nationally and internationally recognized centers of rich collections of books, periodicals, manuscripts, and nonprint materials where Washington University's students and faculty, as well as other scholars, may study the ideas and events of men and women in a wide variety of social and humanistic subjects. They also continued to improve as important centers of information for faculty and graduate students studying and conducting research on the growing edge of knowledge in the pure and applied sciences. The libraries, with their 1,860,000 books, 15,117 serials subscriptions, 1,074,326 microforms, and the more than 7,000,000 manuscripts, retained their standing as the largest academic research collection in any private university between the Mississippi River and California.



Charles D. Churchwell
Dean
Washington University
Libraries

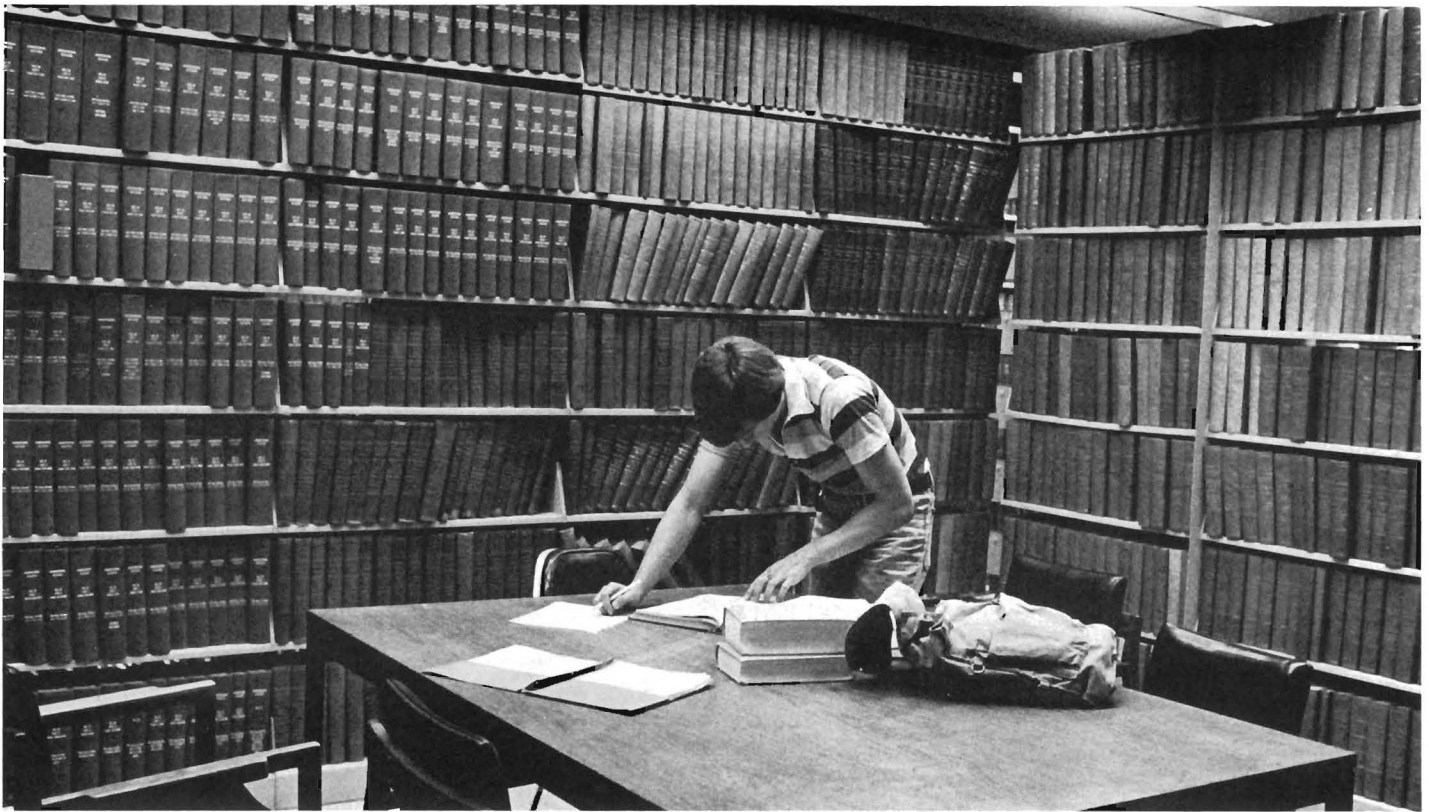
Decisions about the contents of the collections and the kinds of library services provided continue to be made to complement the teaching and research programs as they are developed by the faculty. The ultimate value of the library to the University is determined by the extent to which it satisfies the informational needs of its students and faculty. During the year, steady progress was made to improve the library services offered our students and faculty, and more of them used the library this year than last year. In the main library alone, Olin, the turnstile registered more than 900,000 entries by persons who borrowed more than 500,000 volumes for outside use. More individualized and specialized reference and bibliographical services were also provided to freshmen and full professors alike. Statistics for the year show that Washington University libraries continue to be a good neighbor to higher education in the St. Louis area and far beyond. More than 200 library cards were issued to faculty members of thirteen local colleges and universities, and our libraries continued to be heavily used by students attending other local institutions. From its special collections and through interlibrary loans, the library

also served a large number of graduate students and scholars throughout the world of scholarship. Although we borrowed about 3,000 volumes from other institutions, we lent them twice as many. The 3,000 volumes we borrowed, however, were very important to our graduate students and faculty; hence, cooperation with other research libraries continues to be an important element of our total library services.

The Friends of the Libraries of Washington University sponsored two splendid events to celebrate some significant improvements in the space for library users in Special Collections and within the west reserve reading room. A new reading room in Special Collections and a new and enlarged display area were opened in September, 1981. The reading room houses the superb Gert von Gontard collection on German art, literature, music, and theater which Mrs. von Gontard gave to the University last year. The new exhibit area makes it possible for students to become aware of and enjoy the many rare, and in some cases unique, materials that are available in Special Collections. We deeply appreciate Mrs. von Gontard's generosity in providing funds for the construction and furniture for both of these handsome physical additions to Special Collections.

In May 1981, the Jane and Whitney R. Harris Reserve Reading Room was dedicated with 170 persons in attendance. This spacious reading room also contains the Whitney R. Harris collection on the Third Reich, given two years ago. The Harris' gifts include an elegant Sheiva Indian rug for a special informal reading area within the room named in their honor. This very pleasant environment should greatly encourage students to read and use the valuable materials contained in the Third Reich collection, and the income from the endowment which the Harris' also established will ensure the maintenance of both the collection and the special reading area. We are grateful to the Harris' for their continued support of Washington University.

A generous \$45 million challenge grant to Washington University from the Danforth Foundation is making possible a \$4 million endowment to help pay the costs of automation in Olin Library. Establishment of the endowment depends on our earning the matching



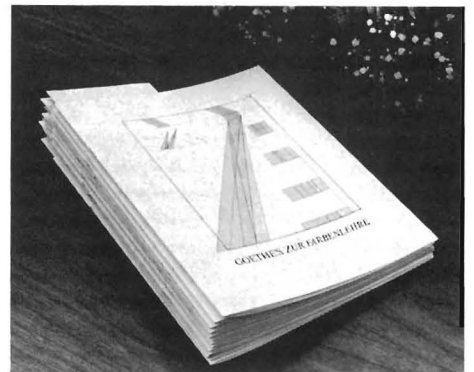
funds required to qualify for the gift. Announcement of this splendid opportunity to strengthen library services was the most important event of the year.

For many more years, the research libraries at Washington University, like those at other major research universities, will continue to collect, organize, and preserve books, periodicals, and manuscripts as major sources from which most students, faculty, and scholars obtain information. Nonetheless, rapid developments in telecommunications and computerization make storage and distribution of vital information on computer tapes, video discs, and microforms no less essential to teaching and research at Washington University than traditional sources. The income from the anticipated \$4 million endowment will ensure the careful development of an automated information system at Washington University with an on-line catalog as its first component. Such steady income can also ensure the development of a system that will make the University's own enormous library resources as well as outside resources more accessible to its students and faculty. This innovative approach to support library automation and improve library services is in keeping with the University's decision to sustain an excellent library system.

The usefulness of this brief report would be greatly limited without the inclusion of one other very important event of the year. The Library

Task Force and its parent body, the Commission on the Future of Washington University, completed their work and made their final recommendations during the year. It would be difficult to overstate the value of this unique experience in university-wide planning to Washington University, in particular, and higher education, in general. The rigorous and constructive thinking of the twenty-five-member Library Task Force, composed of prominent men and women from outside the University, resulted in a set of creative and sound recommendations which will guide the library for the next several years. We are most grateful to those persons who gave so generously of their time and experience to assist the library and the University in the execution of this very worthwhile undertaking. We are, of course, no less appreciative of the financial resources given by friends of the libraries.

Olin Library is completing its twentieth year of service this year, and the two decades of steady growth into a prominent research library have created a number of serious space problems, the most acute being a lack of space to house more volumes and protect the collections which are increasing in value each year. The successful management of these and related problems during the coming year will be our major challenge, and the library staff and I are looking forward to another year of fine achievement.



School of Medicine

The School of Medicine had an excellent year in 1981-82, and I am pleased to have this opportunity to describe a few of the highlights.

The number of students enrolled in pursuit of the degree of doctor of medicine increased steadily during the late 1960s and early '70s, and has remained rather stable for the last seven or eight years. In 1971 our enrollment for all four classes was 429; in 1981-82 it was 530. The total included 133 women and 397 men; fifty-two black students, one American Indian, and one Mexican-American. They represented forty-one states, the District of Columbia, and seven foreign countries.

The fall 1981 first-year class of 122 students was selected from 6,166 applicants. The entering students carried an undergraduate grade point average of 3.62 in science courses and 3.64 in nonscience courses, for an overall average of 3.63 on a 4.0 scale.

Last year 208 students, located primarily on the east campus, were in pursuit of the Ph.D. degree in one of the biomedical sciences; sixty-nine of them were in the Medical Scientist Training Program, which enables a student to qualify for both the Ph.D. and the M.D. degree in six years. The number of such students has grown steadily over the last decade, from thirty-six in 1972 to sixty-nine in 1981. From this group will emerge the medical faculties of tomorrow.

The number of students in the allied health fields also continues to increase. In 1981-82 there were eighty-eight students in the Health Administration and Planning Program, eighty in the Program in Occupational Therapy, sixty-one in the Program in Physical Therapy, forty-six in X-ray Technology, eight in the Pediatric Nurse Practitioner Program, five in Nuclear Medicine, and five in the Radiation Technology Program.

Postdoctoral education remains a vital effort in the Medical Center. This past year 152 interns, 442 residents, and 169 postdoctoral fellows and trainees were at work in our teaching hospitals and laboratories.

On May 21, 1982, a total of 128 young men and women were granted the degree of doctor of medicine. After commencement exercises on the Hilltop campus, the graduating seniors were recognized individually in a second ceremony at the Chase Hotel. The featured speaker on the program was Helen Caldicott, president of Physicians

for Social Responsibility, who delivered a somber warning against nuclear war.

The reputation of a School of Medicine rests squarely on the reputation of its faculty. For several years five of our faculty have been in numbers of the prestigious National Academy of Sciences. In May 1982, two additional faculty members were elected to the Academy at the same time. Stuart Kornfeld, M.D., and Donald C. Shreffler, Ph.D., were two of sixty new members elected to the Academy at the organization's annual meeting in "recognition of their distinguished and continuing achievements in original research." Kornfeld, professor of medicine and biochemistry and co-director of the Division of Hematology-Oncology at Washington University, was recognized for his research on the biochemistry of glycoproteins. His work has helped to elucidate the structure of the carbohydrate units of these molecules and to define the steps in their biosynthesis. Shreffler, James S. McDonnell Professor of Genetics and head of the department at Washington University, was acknowledged for his study of immunogenetics and biochemical genetics of the major histocompatibility gene complexes. He is a specialist in the genetics of the immunologic system and in the genetic basis for molecules that cause organ and tissue transplant rejections.

The high point of the year in terms of strengthening our faculty was the appointment of Samuel A. Wells, M.D., as Bixby Professor and head of the Mary Culver Department of Surgery. Wells, formerly professor of surgery at Duke University Medical Center, joined our faculty in October 1981. He also serves as surgeon-in-chief at Barnes and St. Louis Children's Hospitals. A faculty member at Duke since 1966, Wells directed that university's Clinical Research Unit. One of his specialties has been transplantation surgery of the parathyroid glands, which produce the hormone that regulates calcium and phosphate metabolism.

The School of Medicine was pleased to announce recently the creation of two new endowed chairs: the A. Ernest and Jane G. Stein Professorship of Developmental Neurology held by Joseph A. Volpe, M.D., professor of pediatrics, neurology and biological chemistry, and the Alumni Professorship held by Philip Needleman, Ph.D., professor of pharmacology and head of the Edward Mallinckrodt Department of



M. Kenton King
Dean
School of Medicine

Pharmacology. Volpe specializes in the biochemistry of the developing brain. A. Ernest Stein, who, with his wife, Jane, is endowing the chair, has been a certified public accountant for more than fifty years. He founded his firm in 1939 and served many leading St. Louis businesses. A 1926 graduate of Washington University, where he was elected to Phi Beta Kappa, Stein attended the Harvard Graduate School of Business Administration and received the master's degree of business administration in accounting from New York University. Needleman is internationally known for his study of the effects of prostaglandins and their intermediates on the renal and cardiovascular systems. The Alumni Professorship is the first named professorship to be endowed by alumni of an American medical school.

The past year has produced exciting new developments in the relationship between the School of Medicine and private industry. In September 1981, the nation's largest single-university-industry agreement for hybridoma technology research, totaling \$3,881,250, was jointly announced by Washington University and Mallinckrodt, Inc. Hybridoma technology research involves the production of specific monoclonal antibodies from artificially created cells called hybridomas. The antibodies hold promise for greatly improving diagnostic medicine and clinical treatment of many diseases. The

program supports hybridoma research guided primarily by Joseph M. Davie, M.D., Ph.D., head of the Department of Microbiology and Immunology. Scientists from the Departments of Pathology and Internal Medicine are working closely with Davie in the development of monoclonal antibodies which will be useful in such areas as immunology, heart disease, malignancies, blood clotting, and infectious diseases.

A monumental agreement was announced with Monsanto Company in early June 1982. Washington University announced a five-year agreement with this St. Louis-based industrial giant to conduct biomedical research focused in the areas of proteins and peptides which regulate cellular functions. The two institutions signed a general contract totalling \$23.5 million, under which individual research projects will be carried out by cooperative arrangements involving faculty at the School of Medicine and Monsanto scientists. Selection of projects to be pursued will be made by an advisory committee composed of individuals appointed by Monsanto and Washington University. David M. Kipnis, M.D., Busch Professor and head of the Department of Internal Medicine, will direct the program and serve as chairman of the advisory committee. During the third year of the five-year agreement, the entire program will be reviewed by a panel of distin-

guished scientists who are independent of both Monsanto and Washington University. Under the agreement, faculty members participating in the projects are at liberty to publish results of their research. Patents on any inventions arising from the projects will be held by Washington University with exclusive licensing rights to Monsanto.

Last year I reported that the highest priority of the School was planning and raising funds for a new Clinical Sciences Research Building to be located immediately north of the Wohl Clinic Building and extending over Audubon Avenue onto the block formerly occupied by the St. John's Hospital. Ground was broken for construction of this building in August 1981. The facility will contain 382,000 gross square feet of space for seven clinical departments. It will link the clinical facilities of the Medical Center with the Jewish Hospital and St. Louis Children's Hospital. The total cost is estimated to be \$50 million. Half of the total, \$25 million, will be financed from savings accumulated by the dean and departments of the School of Medicine over the past ten years. This level of commitment of institutional resources to a construction project is unprecedented. The private fund-raising goal for the building is \$21 million. The realization of a new Clinical Sciences Research Building in this decade will ensure the perpetuation of Washington University's tradition of excellence and leadership in biomedical research. At this writing, the building is one-third completed.

About a year ago, the Task Force of the Commission on the Future of Washington University, ably chaired by John W. Hanley of Monsanto Company, submitted its report on the School of Medicine. I am pleased to quote one encompassing paragraph from that report:

"The School is an institution with a well-deserved and recognized reputation. The quality of medical school instruction, scientific research, delivery of health care, transfer of medical knowledge, values and ethics to students, and dedication and quality of the faculty are all of the highest order."

In November 1981, the Executive Faculty of the School approved a written response to the Hanley Report, which was forwarded to Chancellor Danforth. We have subsequently been busy working on the recommendations for change which were contained in the report.

We have had an excellent year and face the future with high hopes.



School of Social Work

While the external environment for human services deteriorated lamentably last year, the School of Social Work experienced reassuring continuity in most of the fundamental sources of its internal strength.

Scholarly productivity of the faculty, for example, reached new heights. More books were written by the faculty in 1982 than in any other year in the entire history of the School. Professor Ronald Feldman is the senior author of *The St. Louis Conundrum: Changing Antisocial Boys in Prosocial Groups*. He is also the chairman-elect of the editorial board of the National Conference on Social Welfare. Assistant Professor Eloise Rathbone-McCuan coauthored, with alumna Joan Hashimi, a book entitled *Isolated Elders: Health and Social Interventions*. Professor Martha Ozawa's volume on *Income Maintenance and Work Incentives: Toward a Synthesis* and Assistant Professor Rita Numerof's *The Practice of Management for Health Care Professionals* also appeared this year. Professor Aaron Rosen, in collaboration with alumnus John Stretch, completed his work on *Doctoral Education in Social Work: Issues, Perspectives, and Evaluations*, and Assistant Professor Michael W. Sherraden coedited, with Donald J. Eberly, a volume entitled *National Service: Social, Economic, and Military Impacts*.

In addition, faculty contributions to the field — through their research papers, conference presentations, work on editorial boards, chapters in books, invited addresses at scholarly meetings, and service as board members and officers of professional and social welfare organizations — were both numerous and significant.

The 1981 entering class included students from thirty states and eight foreign countries. The admitted students came with impressive scholastic and social-service backgrounds. Although the entering class was slightly larger than in 1980, the overall enrollment, as in several other social work schools, was the lowest in the last ten years.

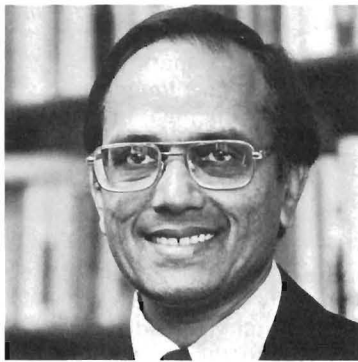
Since the paucity of financial assistance is the principal obstacle in the pursuit of graduate social work education by many talented students, the School devoted considerable energies to address this problem. It has been exacerbated infinitely recently by the precipitous reduction of federal support of education for human service professions. The year was noteworthy for the establishment of ten new scholarships at the School. The Board of

Trustees of the Jewish Community Centers Association of St. Louis established a scholarship to honor G. Duncan Bauman, publisher of the *St. Louis Globe-Democrat*. Another endowed social work scholarship was made possible through a gift from the Joseph H. and Florence A. Roblee Foundation. Friends and admirers of David Rabinovitz, a graduate of this School who retired as executive vice-president of the Jewish Federation of St. Louis, have funded an endowed fellowship in his honor. The Sydney and Sylvia Jacob Scholarship and the Holloway Scholarship were also established last year. Other new fellowships include the Alumni Fellowship, Frank Bruno Fellowship, William Burke Fellowship, Helen Hayden Fellowship, and Benjamin E. Youngdahl Fellowship. It is heartening to report that the response of the community to our appeal for student support surpassed our expectations. It has laid a firm foundation on which to build in the years ahead.

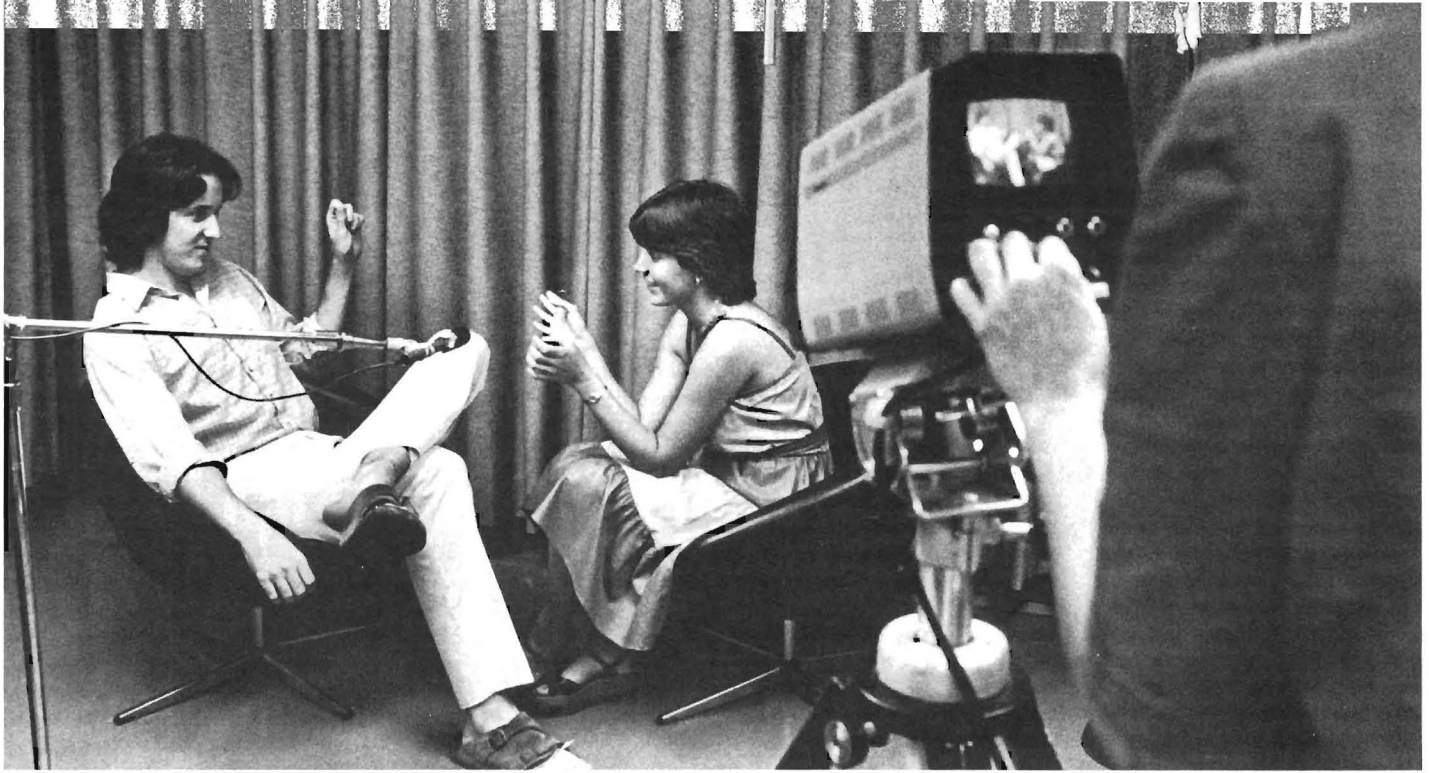
Alumni support, too, increased markedly last year and exceeded the amount received in any previous year. The School and the alumni worked in close concert on many projects involving visiting speakers, prospective students, phonathons, and practicum and placement activities. The Alumni Association established a Distinguished Alumni Award to recognize a graduate who has made outstanding contributions to the field of social work. David Rabinovitz was the first recipient of this honor.

The continuing education division sponsored twenty workshops and institutes for more than 900 participants. Six persons successfully completed the certificate program in family therapy. Several staff development programs were offered for personnel of the various human services departments of the State of Missouri. The Morris Wortman Institute sponsored a two-day program on family therapy by Olga Silverstein of the Ackerman Institute for Family Therapy, New York City. This program attracted nearly one hundred participants.

Under the energetic stewardship of Jo K. Mink, director, and Heather L. Craig, associate director, the Region VII Child Welfare Training Center hummed with conferences, colloquia, consultations, institutes, workshops, videotape productions, and other training and information dissemination activities. The staff of the Center funded by the Health



Shanti Khinduka
Dean
George Warren
Brown School of
Social Work



and Human Services Departments, was in constant demand by child welfare agencies as issues of child neglect and abuse, foster care, and quality of child welfare services became items of heated public debate in St. Louis and the state. The Center developed and distributed special training materials to improve workers' skills in helping black families. It organized a forum on adoption and related matters for state agency administrators from Missouri, Iowa, Nebraska, and Kansas. The highlight of its work was the notably successful first National Conference on Social Work and the Law: Critical Issues in Child Welfare Practice, which took place here in April. This conference attracted more than 225 social workers, attorneys, judges, and government officials from thirty-eight states. Clarence Hodges, commissioner, Administration for Children, Youth and Families, Department of Health and Human Services, was a featured speaker.

Other distinguished guests at the School last year included Mary Ann Quaranta, president of the National Association of Social Workers; Professor Mitchell Ginsberg of the Columbia University School of Social Work, who delivered the Benjamin E. Youngdahl Memorial Lecture; and Al Kemp, regional director of Health and Human Services, Kansas City. The School began a new Thursday Lecture Series designed primarily for social work students and professionals, but open also to the community. It brought to Brown Hall many local and national speakers. A number of School faculty and students also presented colloquia in this popular series.

A landmark in the development of the School was reached last year when

the Social Work Task Force of the Commission on the Future of Washington University completed its report. The Task Force studied the School exhaustively and made valuable recommendations covering the entire gamut of the School's program including its educational mission, its plans for the future, the pattern of the classroom curriculum and the practicum, the quality of student life, the placement services, the governance of the School, the alumni, and the community support for the School. The Task Force noted: "...The George Warren Brown School of Social Work is a nationally ranked and highly respected graduate institution enjoying a long history of excellence in scholarship and professional education. The achievements of its faculty, students, and alumni actively contribute to the continuation of that proud heritage in the history of social work education in this country. The School is a fully contributing partner in the pursuit of excellence at Washington University."

The faculty devoted several meetings to a serious examination of the recommendations of the Social Work Task Force. They are grateful to this group of eminent and influential people for the probing evaluation of the School and for the insightful recommendations, some of which have already been implemented. As a direct outcome of such recommendations, for instance, we have become perhaps the first school of social work in the country to employ a full-time professional placement officer exclusively for our own School. A resources committee is also going to be formed soon, again in line with a recommendation of the Task Force concerning the need for enhanced community

involvement to support the School.

As James L. Johnson, Jr., chairman of the Task Force, wrote in his forwarding letter to W. L. Hadley Griffin, chairman of the Commission on the Future of Washington University, the momentous changes in the availability of federal monies and the abrupt cessation of federal grants might necessitate a reexamination of "the plans and assumptions concerning the financial situations at GWB." The School recognizes the altered environment in which social work education must now take place. Declining enrollments, disappearing training and research grants, and a tightening of the job market for its graduates have injected a greater sharpness of purpose and direction into our internal affairs. Ongoing evaluation, improvements, and adaptation of our curriculum; an unremitting commitment to the quest for excellence in instruction and inquiry; a resolute refusal to be demoralized by the fashionable dogmas and shibboleths of the day; a determination to deal with the changing reality rather than to complain about it; and an intellectual discipline to face the tough questions about our goals and our role, characterize the mood of the students and faculty of the George Warren Brown School of Social Work. The fact that it receives generous and steadfast support from more than 3,000 alumni and from an expanding number of friends in the St. Louis community only strengthens our commitment to make, in the words of the Social Work Task Force, "George Warren Brown a more distinguished School of Social Work."

Financial Condition of the University

The fiscal year 1982 ended with income in excess of expenditures. However, transfers of unusual magnitude to temporary endowment resulted in a modest decrease in general reserves. Many factors contributed to the 11 percent increase in income in the past year, with the largest increases resulting from student tuition and fees, patient and laboratory fees, and organized patient-care activities.

Below is a brief analysis of total income and expenditures, operations of separate fiscal units, and University assets and investments.

Total Income and Expenditures

Income

The University has four major sources of support for activities represented by its expenditures. These are:

Operating Revenue

Total operating income, primarily from payments by those who benefited directly from the University's operation, amounted to \$157,827,000. Student tuition and fees accounted for \$50,197,000. Patient and laboratory fees for medical services provided by faculty and staff amounted to \$37,398,000. Income from organized patient-care activities, such as the Edward Mallinckrodt Institute of Radiology, was \$29,607,000. The auxiliary enterprises,

including residence halls, food service, and bookstores, had income of \$13,092,000. Current funds investment income was \$7,935,000, while other miscellaneous operating income totaled \$19,598,000.

Government Grants and Contracts

A large portion of the research done by the University is sponsored by grants and contracts from governmental agencies, mostly federal, for specific sponsored projects. Total income from governmental sources expended in fiscal year 1982 was \$64,819,000, an increase of \$2,056,000 over the previous year. Included in this total is \$4,657,000 for scholarships and traineeships, a decrease of \$143,000 under the previous year. In addition, 90 percent of the total \$2,276,000 student loan funds issued under the National Direct and Health Professions Loan Programs was funded by the federal government.

Private Gifts, Grants, and Contracts

Washington University received a total of \$57,220,000 in gifts (including bequests of \$40,217,000) and grants from private sources for various purposes. Major sources include alumni, individuals, business corporations, and foundations. The table below presents a breakdown of the total gifts, grants, and bequests received by source and purpose. The total \$57,220,000 was divided as follows: \$13,767,000 for operating purposes which includes \$3,021,000 in unrestricted gifts and

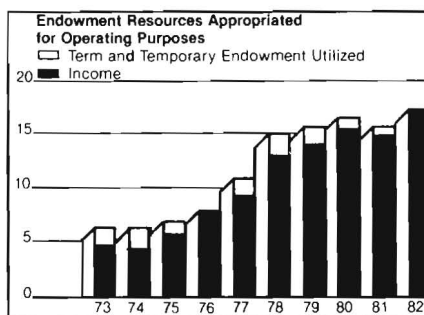
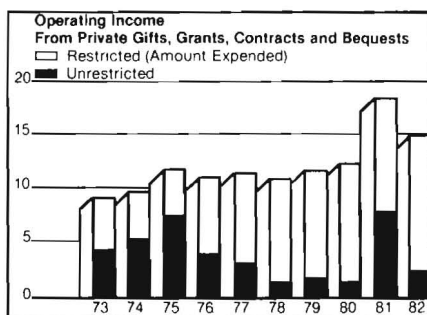
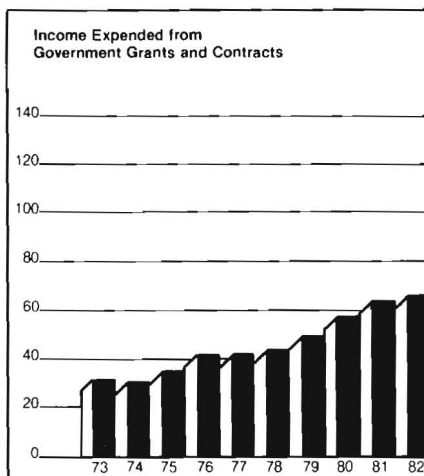
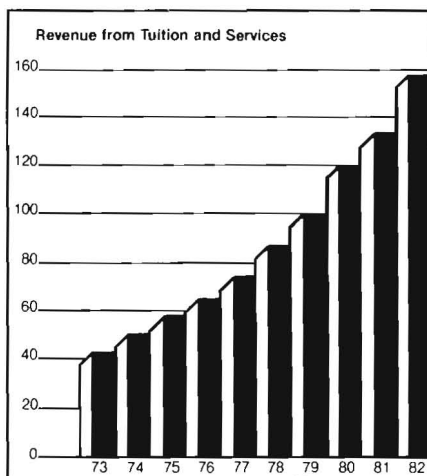
Private Gifts, Grants and Bequests Received

Source:	Total Received	Excluding Mallinckrodt Bequest	Purpose:	Total Received	Excluding Mallinckrodt Bequest
Trusts and Foundations	7%	21%	Endowment	72%	15%
Business Corporations	7%	20%	Current Operations	5%	16%
Alumni	73%	20%	Sponsored Research and Other Sponsored Projects	18%	55%
Agencies and Groups	7%	20%	Plant	4%	13%
Individuals	6%	19%	Student Aid	1%	1%

Total Private Gifts, Grants and Bequests = \$57,220,000

Excluding Mallinckrodt Bequest for Endowment = \$19,152,000

Ten Year Comparison of Operating Income by Source (in millions of dollars)



\$10,746,000 for sponsored research, other sponsored programs, and scholarships; \$40,891,000 for endowment; \$2,480,000 for plant; and \$82,000 for student loans. In the table, \$470,000 in scholarships is combined with \$82,000 in loans for total "Student Aid" of \$552,000.

In addition to these private gift sources, the University also receives funds through private contracts for sponsored projects. In fiscal year 1982 these contracts amounted to \$2,626,000 which, when added to the \$10,746,000 referred to above, brings the total for sponsored programs to \$13,372,000. Of this total, \$1,403,000 is being held for future expenses on sponsored programs. The remaining \$11,969,000 was expended for current operations in fiscal year 1982 and, combined with the \$3,021,000 in unrestricted gifts, brings the total private gift, grant, and contract income utilized for operating purposes to \$14,990,000. The ten-year chart on this page reflects large unrestricted grant support from the Danforth Foundation for the years 1973 through 1977 and a large bequest in 1981.

Endowment

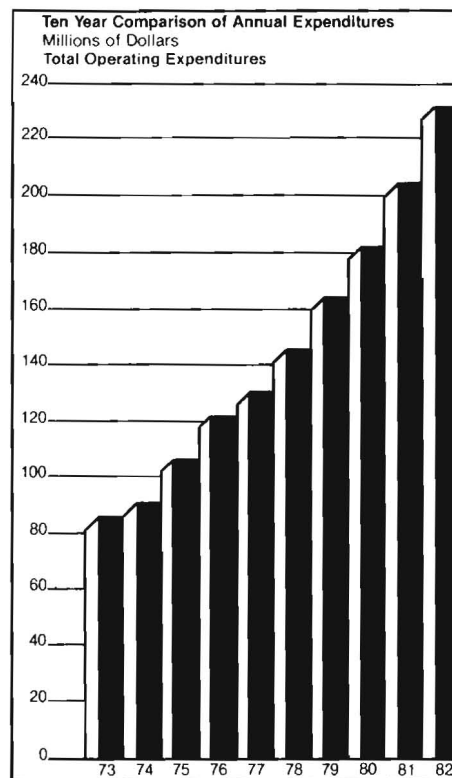
The investment of endowed funds resulted in \$16,933,000 of income used to support operating expenditures.

Expenditures

The total operating expenditures of Washington University in fiscal year 1982 amounted to \$232,298,000. In 1981 this figure was \$209,317,000. Approximately 43 percent of the increased expenditures was attributable to instruction and student aid. Research, primarily supported by outside agencies, accounted for another 12 percent of the increase, 13 percent of the increase was in academic support, and 10 percent of the increase was in operation and maintenance of physical plant.

Included in operating expenses is student aid (scholarships, fellowships, and stipends) amounting to \$16,889,000 from University income and from governmental and private sources, but excluding College Work Study, Pell Grants, and the State of Missouri Student Grant Program. The accompanying summary reflects undergraduate financial aid for the past three years.

Student loans and capital expenditures for buildings are not expended from current funds — their sources are separate fund categories. All student loans issued during fiscal year 1982 totaled \$3,091,000, compared with \$3,317,000 in the prior year. Capital expenditures for buildings were \$19,571,000. Investments in all physical facilities, including buildings, land, equipment, and library acquisitions, increased \$29,295,000.



Summary of Undergraduate Financial Aid (Excluding Loan Funds)

Thousands of Dollars

Fiscal Year	Tuition Remission	Restricted Scholarships	College Work Study	Pell Grants	State of Missouri Grants	Total
1980	\$ 3,805	\$ 1,501	\$ 1,184	\$ 1,057	\$ 559	\$ 8,106
1981	4,254	1,782	1,250	868	839	8,993
1982	5,645	1,827	1,106	754	822	10,154

Operation of Separate Fiscal Units

The University follows a policy of encouraging its schools to operate as independent fiscal units wherever possible. Each of the independent units is responsible for supporting its operating expenditures with its income, and each maintains an individual reserve of funds.

The Schools of Dental Medicine, Engineering, Law, Medicine, and Social Work have been independent units for a number of years, and the School of Business Administration has been an independent fiscal unit for three years. The Schools of Architecture, Arts and Sciences, and Fine Arts, plus general University services and activities such as Olin Library, are grouped in one fiscal entity presently referred to as the Central Fiscal Unit. The Central Fiscal Unit is reimbursed for services rendered to the independent units.

The Central Fiscal Unit, as well as all of the schools which are separate fiscal units ended the year with income in excess of expenditures and mandatory transfers. The planned transfers by the Schools of Dental Medicine, Engineering, Medicine, and Social Work from their general reserves to endowment, plant, and/or student loans resulted in small decreases in their general reserve funds. The expenditures of the Computer Systems Laboratory exceeded income.

A Summary of Current Funds Revenues, Expenditures, and Transfer from General Reserves follows.

University Assets

Institutions of higher education and other not-for-profit organizations keep their financial resources in the form of funds to comply with the wishes of donors and to account properly for government grants and contracts. A separate fund is established for each project or purpose. The thousands of funds for which Washington University is accountable are handled in four major

groupings: current funds, student loan funds, endowment funds, and plant funds. With the exception of income from the investment of endowment funds, the ongoing operating expenditures of current funds may not be offset by resources of the other three fund groupings. The Summary of Assets, Liabilities, and Fund Balances as of June 30, 1982, presents the assets and any claims against them for the four fund groupings.

Current funds must be separated between unrestricted and restricted funds. The unrestricted current funds consist of revenues from the various income-producing operations of the University, plus unrestricted gifts and unrestricted earnings from endowment. Expenditure of these unrestricted funds is left to the discretion of the University. Other funds available for current operations restrict expenditures to a given department or school, or for special designated purposes such as research in a specified field or by a specified person. Unrestricted and restricted funds are combined in the overview of current operations of the separate fiscal units presented previously. They are kept distinct in the accompanying Summary of Assets, Liabilities, and Fund Balances.

As of June 30, 1982, the total assets of the current funds were \$97,482,000, including restricted current funds of \$20,097,000 and unrestricted current funds of \$77,385,000. Accounts payable and other such liabilities against unrestricted current funds amounted to \$23,527,000. Another \$37,638,000 of the unrestricted current fund assets was encumbered or otherwise administratively committed for specific future purposes. The net uncommitted general reserves was \$16,220,000.

Student loan funds totaled \$25,849,000. The total student loan fund receivables was \$20,735,000, of which notes receivable from current and former students amounted to \$20,452,000. Outstanding loans to students included \$17,338,000 under the National Direct and Health Professions Loan Programs, which were 90 percent funded by the federal government.

Summary of Current Funds Revenues, Expenditures, Transfers, and Changes in General Reserves for Separate Fiscal Units of the University for Fiscal Year 1982

Thousands of Dollars

	Central Fiscal Unit	School of Business	School of Engineering	School of Law	School of Social Work	School of Dental Medicine	School of Medicine and Related Activities	Computer Systems Laboratory	Total
Revenues:									
Tuition and fees	\$ 25,420	\$ 4,199	\$ 7,394	\$ 3,758	\$ 1,250	\$ 3,485	\$ 4,691		\$ 50,197
Government grants and contracts (research, training, financial aid to students & other purposes)	9,363	41	4,040	73	771	337	49,407	\$ 787	64,819
Private gifts	6,165	606	971	148	8	142	6,950		14,990
Endowment income (a)	8,510	95	693	432	379	27	6,797		16,933
Current funds investment income	2,252	80	286	93	66	134	5,002	22	7,935
Sales and services — educational activities	1,578	70	306	16	98	55	8,040	8	10,171
Sales and services — auxiliary enterprises	11,305						1,787		13,092
Patient and laboratory fees ...						1,442	35,956		37,398
Organized patient-care activities — sales and services							29,607		29,607
Other income and additions ...	4,547	43	204	36	23	73	4,501		9,427
Total revenues	\$ 69,140	\$ 5,134	\$13,894	\$ 4,556	\$ 2,595	\$ 5,695	\$152,738	\$ 817	\$254,569
Expenses and mandatory transfers:									
Instruction	\$ 19,267	\$ 2,380	\$ 5,938	\$ 1,515	\$ 1,213	\$ 3,194	\$ 53,314	\$ 15	\$ 86,836
Research	5,362		2,792		149	126	34,742	510	43,681
Academic support	6,193	1,056	1,166	1,557	572	858	8,039	226	19,667
Student services	3,097	359	758	255	131	188	1,204		5,992
Institutional support	3,336	181	424	196	148	180	3,448		7,913
Operation and maintenance of physical plant	4,309	313	954	433	252	624	9,540	126	16,551
Scholarships and fellowships	8,237	738	1,487	389	117	50	1,040		12,058
Organized patient-care activities							24,601		24,601
Auxiliary enterprises	10,017						1,848		11,865
Miscellaneous services	16					134	1		151
Mandatory transfers	2,296	5	337			8	337		2,983
Total expenditures and mandatory transfers	62,130	5,032	13,856	4,345	2,582	5,362	138,114	877	232,298
Transfers and changes in general reserves:									
Transfers to:									
Student loan funds		108	4	30	52		110		304
Endowment funds	4,866		200		3		9,234		14,303
Plant funds	992	21	93			500	622		2,228
Other reserves	1,137	(74)	(166)	(24)	2	99	5,733	28	6,735
Changes in general reserves	15	47	(93)	205	(44)	(266)	(1,075)	(88)	(1,299)
Total transfers and changes in general reserves	7,010	102	38	211	13	333	14,624	(60)	22,271
Total expenditures, transfers and changes in general reserves	\$ 69,140	\$ 5,134	\$13,894	\$ 4,556	\$ 2,595	\$ 5,695	\$152,738	\$ 817	\$254,569
(a) Endowment at market value with income for:									
Support of current operations	\$128,651	\$ 1,487	\$10,219	\$ 7,209	\$ 5,767	\$ 1,358	\$140,148		\$294,839
Other purposes	9,065	146	2,855	336		72	3,678		16,152
Total endowment	\$137,716	\$ 1,633	\$13,074	\$ 7,545	\$ 5,767	\$ 1,430	\$143,826		\$310,991

Summary of Assets, Liabilities, and Fund Balances as of June 30, 1982

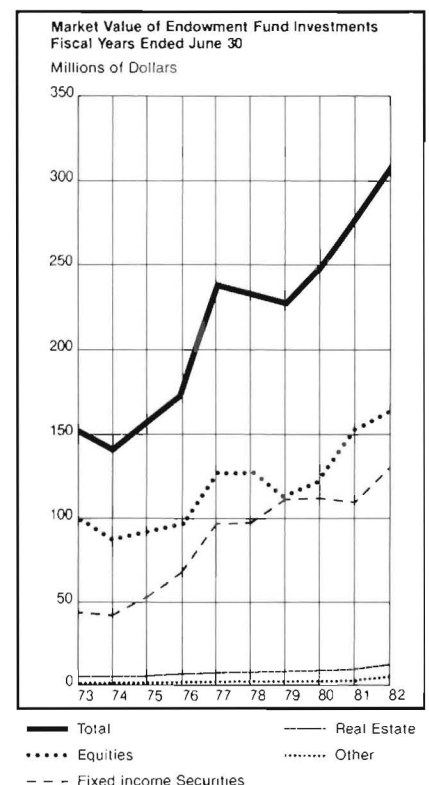
Thousands of Dollars

	Current Funds		Student Loan Funds	Endowment Funds	Plant Funds	Total
	Unrestricted	Restricted				
Assets:						
Cash and securities maturing within thirty days	\$ 8,010	\$ 3,754	\$ 1,542	\$ 14,370	\$ 30,335	\$ 58,011
Investments at book value	26,456	12,398	2,981	310,424	61,552	413,811
Receivables	36,643	3,312	20,735	2,172	3,230	66,092
Plant facilities					291,616	291,616
Other	6,276	633	591	21,156	1,905	30,561
Total assets	<u>\$ 77,385</u>	<u>\$ 20,097</u>	<u>\$ 25,849</u>	<u>\$348,122</u>	<u>\$388,638</u>	<u>\$860,091</u>
Liabilities and fund balances:						
Liabilities	\$ 23,527	\$ 636	\$ 676	\$ 23,960	\$ 97,391	\$146,190
Deferred undistributed investment income		48				48
Encumbered and committed reserves	37,638					37,638
General reserves . . .	16,220					16,220
Balance of funds . . .		19,413	25,173	324,162	291,247	659,995
Total liabilities and fund balances	<u>\$ 77,385</u>	<u>\$ 20,097</u>	<u>\$ 25,849</u>	<u>\$348,122</u>	<u>\$388,638</u>	<u>\$860,091</u>

The total assets of the endowment fund were \$348,122,000, including \$326,996,000 in cash and investments. The market value of endowment investments associated with each of the separate fiscal units is presented along with the summary of expenditures and income for each unit.

Plant funds totaled \$388,638,000. Of that amount, \$291,616,000 was invested in land, buildings, books, and equipment. Total borrowing for physical plant facilities as of June 30, 1982, was \$93,786,000, of which \$8,886,000 represents Housing and Urban Development bonds for student housing and dining facilities; \$20,805,000 represents bonds issued by the Health and Educational Facilities Authority of the State of Missouri to finance partially the construction and improvement of certain educational facilities; and \$59,279,000 represents notes issued by the Health and Educational Facilities Authority of the State of Missouri, also to finance construction and improvement of educational facilities.

\$46,110,000 compared to \$34,314,000 for last year, an increase of \$11,796,000 or 34.4 percent. Endowment income for the same period was \$25,712,000, compared



Investments

Income (interest, dividends, rents, etc.) from all investments for the year ended June 30, 1982, totaled

to \$22,097,000 for last year, an increase of 16.4 percent.

The market value of all investments (endowment, current, plant, student loans, etc.) including interfund advances (loans) and those securities maturing within thirty days totaled \$461,866,000, compared with \$372,613,000 for the preceding year.

The market value of endowment investments was \$310,991,000 on June 30, 1982, compared to \$274,567,000 the preceding year. A comparison of endowment investments over the past ten years is presented in the accompanying chart.

The increase in endowment market

value for the year is the net result of gifts, grants, and net transfers of \$65,488,000 and unrealized market loss on the portfolio as of June 30, 1982, of \$29,064,000.

On June 30 the total investment portfolio was diversified as follows:

Cash and short-term securities	30.6%
Fixed income	32.0
Equities	36.0
Real estate and other	1.4
	<u>100.0%</u>

Net income from securities lending was \$342,000, compared to last year's \$744,000.



Comments by the Chancellor

In the 1981-82 academic year Washington University existed in a complicated and unpredictable environment; yet we must plan and act, making our assumptions and testing our conclusions as best we can. In these efforts we received a great deal of help from the Commission on the Future of Washington University. One of the highlights of the year was the final report of the Commission last December.

The undertaking was monumental. In a four-year period, 270 distinguished individuals gave their time and thought to Washington University. Never before have we received more intelligent and informed scrutiny. We were offered advice and 194 formal recommendations, over half of which have been adopted already. The cost of implementing all recommendations would be staggering. Obviously, many must be delayed. I interpret this fact positively, since I subscribe to the belief that it is better to have good ideas in excess of money rather than vice versa.

A committee of the Board of Trustees, chaired by W. L. Hadley Griffin, studied the reports and issued an excellent statement which in summary follows:

A careful reading of the reports suggests some overall goals for the 1980s:

1. Continue Washington University's growth as a university of international stature
Seek to recruit and retain faculty and students of the highest ability and accomplishments. Research and scholarship should be of significance and should compete successfully for available resources, public and private.
2. Offer first-rate educational experiences to all students in and out of the classroom
First-rate education requires breadth and balance. Undergraduate education, which is central to any university, needs special attention.
3. Concentrate on areas of strength
Each academic unit should emphasize its special contributions to scholarship and to education and build on these strengths. New ways to link resources in mutually supportive endeavors should be sought.
4. Be an integral part of the community and the region
Washington University is

unusual among great universities in its close association with St. Louis. Its development without being parochial should make sense in its geographical setting. Services given as part of the education or research missions should be of high quality.

Expectations and resources were discussed:

A great deal is expected of American universities, especially the high quality research institutions: leadership in basic research, in scholarship, and in advanced training in the professions and the arts and sciences; high quality education for undergraduates, including those disadvantaged; a broad range of services, including continuing education, cultural activities, and athletics. For almost a decade resources have been constrained. Yet new challenges and new opportunities are on the way. For example, we must adapt to advances in technology, to increased competition from industry and the professions for talented individuals who are potential or actual faculty, to the great need for understanding foreign cultures.

There were four financial recommendations:

1. Protect and enhance financial strength
Income and expenditures should be monitored carefully. The most urgent need is for monies to support faculty and staff salaries, student scholarships, and research and scholarly activities. The University does not exist to be financially strong, but its academic goals are dependent on sufficient resources.
2. Concentrate on supporting core programs
Washington University must always be seeking improvement and be flexible and open to new opportunities; however, we view the 1980s as a time of consolidation rather than of expansion.
3. Expenditures for construction should be examined with great care and should meet at least one of the following criteria
 - a. Current space is seriously hampering essential programs and the problem cannot be solved by more effective use of existing space.
 - b. The construction is needed to maintain the value of University property and investment.

c. The costs of the construction itself and any added operating costs will be totally met without draining money from the essential academic programs of the university.

4. Fund raising efforts should be intensified and concentrated on addressing needs for the decade of the 1980s

The commission and the board committee have done their jobs with intelligence and wisdom. Now it is up to the entire Washington University family to rise to the challenges.

The year saw the establishment of new relations with Mallinckrodt and Monsanto. American universities have stayed close to the aspirations of

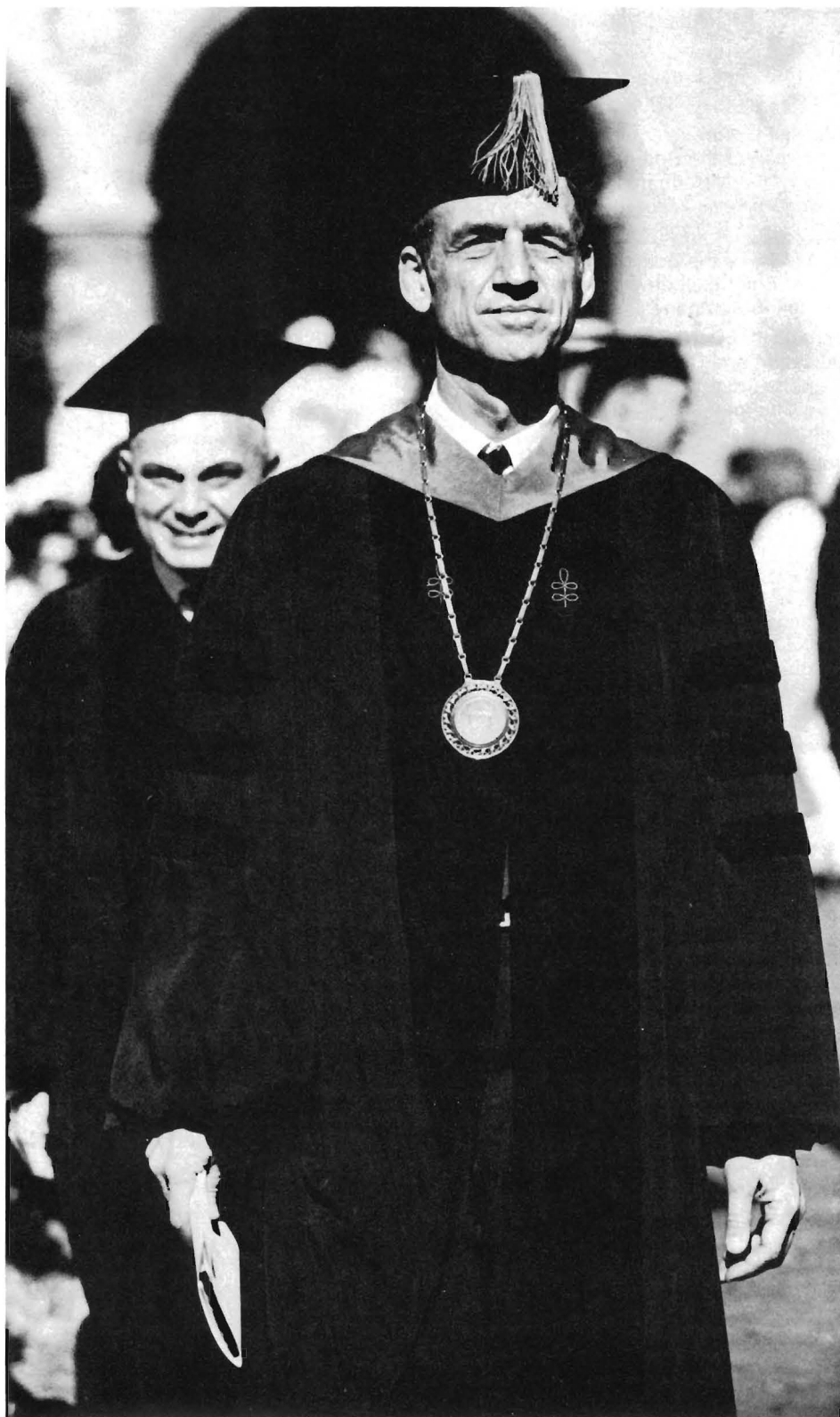
the American people, both the aspiration for a well educated citizenry to make our great democracy function and also the aspiration for a society that brings its citizens material and personal benefits. Success in this latter area has depended on certain key social inventions, such as the great land grant universities started in 1862 and the National Institutes of Health started after World War II to insure research of the highest quality.

Recent advances in science and deterioration of America's relative economic position have made greatly improved cooperation between industry and universities very desirable. A new kind of relationship involving two different types of institutions has been invented which should serve us well and offer helpful patterns to others. These arrangements, which recognize the University's teaching and learning responsibilities, were developed with great care by Professors David M. Kipnis, Joseph M. Davie, Luis Glaser, Paul E. Lacy and others, and by Howard Schneiderman of Monsanto and Thomas O. Oesterling of Mallinckrodt. John W. Hanley, chairman and chief executive officer of Monsanto, who has led his company in the pioneering arrangements with Harvard and with Washington University, and Raymond F. Bentele, president and chief executive officer of Mallinckrodt, showed understanding and vision. Now the job is to make successful these carefully conceived arrangements.

The \$45 million challenge grant from the Danforth Foundation allows Washington University to face the future strengthened financially for several important, but by no means all, responsibilities facing us. The challenge remains of matching the grant and meeting the other needs.

The death of Charles Allen Thomas, board chairman of Washington University from 1966 to 1977, leaves a great void. Dr. Thomas asked me to serve as chancellor and from that time until his death was supportive of me and of Washington University in every way. His life will continue to inspire those of us who witnessed what a single individual could contribute to academia, to science, to industry, to the nation, and to his many friends.

Wm Danforth



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F O R E I G N A F F A I R S



Washington University's international student community has increased markedly in the past five years and is expected to continue to grow. Many students—and their families—slip into U.S. roles with great goodwill. "Our students have many fewer problems than we anticipate they will have," said an International Office staff member, "but that is not to say the adjustment is always easy."

"I think," commented a student, "that as a group we are very determined. That's perhaps a case of prior self-selection."

Chileans Juan Arratia, his wife, Bensa Vera, and their sons, Ignacio, nine, and Felipe, seven. Both Juan and Bensa are graduate students.



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Lybia*

*Christakis Pantelides
Cyprus*

*Hassen Saleh
Ethiopia*

FOREIGN AFFAIRS

By Dorothea Wolfram

When I say, 'Hi,' and they say, 'Fine,' before I can say, how are you, then I know their acculturation is well on its way," says M. Diane Hasty, advisor to international students, with a laugh that bubbles up from her throat.

Perhaps no group at Washington University enjoys its job more than the staff at Stix International House. That is as it should be for the University's international students are homogenous in one opinion: that Washington University's International Office does a very fine job.

"It is, quite simply, the best place on campus," says Inderdeep (Ina) Singh of India, "with the best parties."

If the atmosphere at Stix International House is relaxed, its mission is dead serious. The number of international students at Washington University has increased more than 25 percent in the past five years. The total last year stood at 635, as contrasted to 475 in 1978-79. And Washington University, like its private U.S. counterparts elsewhere, believes that as the number of U.S. students of college age declines (as it has already begun to do), there will be some small salvation in increasing enrollments from overseas. That task, however, is not easily accomplished at a university whose tuition is \$7,125, whose name lacks the recognition of many East and West Coast schools, and whose location is in the U.S. heartland.



The most ready overseas market for U.S. universities is graduate and professional education, but traditionally, graduate students are more heavily subsidized by the institution at which they study than undergraduate students. "I think, however, that person for person, more of our international graduate students are supported by outside sources than our U.S. graduate

students," said William Stone, international office director and associate for overseas admission. "Many governments support technical graduate education, recognizing that although their own colleges and universities can handle undergraduates, they cannot provide graduate education of the same quality as the more developed countries." Ina Singh says, for example, that whereas there may be a dozen electron microscopes in all of India, there are two in the engineering laboratory in which he studies.

Recruiting for undergraduates, always much harder, is becoming even more competitive. Few governments offer undergraduate support. Malaysia supports native Malay students, but India not only does not support undergraduate education outside of its borders, it will not allow private funds to flow from the country for that purpose. Until recently Taiwan followed the same prohibition.

There are, obviously, a number of OPEC nations that are prime targets for undergraduate recruiting. Stone says that Washington University's more than 200 undergraduate students are not, however, from a few readily identifiable sources.

"I would not say that our undergraduates come from predominantly affluent families," says Hasty. "Their families are occasionally poor, more often middle class. I know a number of cases in which entire extended families are pooling resources to educate one exceptionally promising family member. When that is true, the pressure on our student is immense."

Washington University is among the few U.S. universities that offer undergraduate scholarships to students from overseas. According to Kathie Laird, coordinator of overseas admissions, the eighty-one current awards average \$3,000 each.

"Even with the aid we offer, the resources available to international

students are severely limited," says Laird. Students are cautioned not to count on working to supplement their income. Visa regulations limit off-campus employment for students and their spouses, and Laird adds, "On campus, these students compete with U.S. students who can work under federally subsidized work-study."

The international office requires that all overseas applicants substantiate financial support to cover a year's expenses including summer: this year approximately \$12,500.

International applicants are required to take the Scholastic Aptitude Test (or an equivalent) or the appropriate graduate admissions test (most often the Graduate Record Exam). In addition, they must score 450 or better on the Test of English as a Foreign Language (TOEFL).

"Our undergraduates may have slightly lower verbal SAT scores than our U.S. students, but many have fantastic math scores," notes Hasty.



Broadly defined, Asia—including Indonesia, India, and Malaysia—is the continent of origin for 50 percent of Washington University's international community. Students from the Middle East make up some 17 percent and from Western Europe some 13 percent. Latin America and the Caribbean and Africa each account for about 9 percent. Surprisingly, less than ten students come to Washington University from Canada annually.

Not surprisingly, engineering attracts the lion's share of the University's international students. Last year it had 160 foreign graduate students and 126 undergraduates, or almost 45 percent of those students enrolled in the University's nine divisions. Graduate and undergraduate arts and sciences enrolled 190 (127 graduate and sixty-

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three undergraduate students), mostly in the sciences. The Schools of Social Work and Architecture accounted for the only other large numbers of foreign students. Although no area of the University is bereft of foreign students, the School of Law almost belies that statistic.

Despite strict attention to the TOEFL scores, students for whom English is not the first language—and one must recall that British colonization greatly narrowed that number—may encounter unexpected language difficulties. "Often students come with excellent book English—a good grammatical grasp and an extensive vocabulary—but without comparable proficiency in speaking and understanding," says Patricia Eldadah, acting coordinator of the English language program. Eldadah routinely evaluates all incoming students. Five English-as-a-foreign-language courses are offered each semester through University College. The basic semi-intensive course stressing oral English meets daily; others meet twice a week. The International Institute of St. Louis offers intensive beginning courses. Its courses and the University's draw other new St. Louisans, as well as students.



Eldadah, herself just returned from five years in Egypt, explains that the purpose of intermediate courses is to gain enough proficiency to function in life in the United States, as well as at Washington University. "We offer practice in speaking and listening with lots of emphasis on idioms and slang. But, we also, for instance, teach objective-testing techniques because many of our students are not familiar with this testing method." The notion that international students are better equipped to handle the language of the

classroom and laboratory than of the grocery store brings smiles and nods from many.

On the blackboard of Gretchen Felix's Monday-Wednesday evening conversation and pronunciation class is written, "I can't stand _____," a phrase so natural to Americans it is difficult to recognize as an idiom. She has just explained it. "Anything you can't stand, Jacob?" she asks.

Jacob, a native of Leningrad, pauses with furrowed brow, then lights up with, "I can't stand when my daughter doesn't listen to me." The empathy of his eleven classmates swells into laughter.

Mrs. Felix turns to a Chinese student to ask the same question. His "I can't stand—the weather!" boils up another appreciative swell of laughter. St. Louis's September humidity takes the same toll among students from hot dry lands as it does from Houstonites or Portlanders (Maine or Oregon).

They practice the tip-of-the tongue "th" of "ether" and the throaty "th" of "either" with "breath" and "breathe," "teeth" and "teethe," and "wreath" and "wreathe." She makes sure they understand word meanings, although that was to have been studied in preparation. They go through the "z" and "s" sounds of "zoo" and "sue," "lazy" and "lacy," "eyes" and "ice," and "seizing" and "ceasing." She leads and they follow in unison for the stresses of "lazy summer days," "that's all right," "this, that, and the other," and "Face the facts, Smith!" She listens also for the buzz of misplaced "z's."

They practice the inexplicably falling intonation of questions such as, "Who's coming with you?" and "How did you get here?" and "How's the weather?" They break into two groups to select an interviewee among each and to go through a set of biographical questions.

Mr. Portnoy says he is from Leningrad. "Ah, Russia," responds a groupmate.

"No, U.S.S.R.," insists Portnoy's companion from the Ukraine. "It is not all Russia!" The young woman blushes and corrects her notes. Mr. Portnoy says his favorite American food is seafood, but several classmates convince him *that* is not American, so he emends it to hamburger. That, everyone agrees, *is* American. (Later, Mrs. Felix defends Jacob's original response but sighs with the class that seafood is more readily available on the coasts than in St. Louis.)



There is confusion over Mr. Portnoy's weight. Someone says fifty-five kilograms, but a slight Chinese student laughs that *he* weighs fifty-five kilograms, not the huskier Mr. Portnoy, whose weight is established at eighty kilograms and translated into 180 pounds.

The group across the small room is stuck on Mr. Wang's shoe size. The young woman from Iran offers that she wears a size thirty-seven at home which translates into a 7½ American, so Mr. Wang must also wear about a 7½. That is accepted. Mr. Wang says that he lives in an ancient capital in the center of China.

The Ukrainian suggests that Mr. Wang lives "in the heart" of China. It is Mrs. Felix who lights up then, with "Oh, yes, very good."

On comparing interview information, the confusion of shoe size again surfaces. It is discovered that in China and some other countries shoe sizes are determined by centimeter measurement from toe to heel (there are murmurs of appreciation for the sensibleness of that system.); in the U.S. by some undetermined standard, in Russia by some other undetermined standard, and, in Argentina—says a student from there—by the number of stitches the shoemaker took from toe to heel. All

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marvel at the enlightening bit of trivia.

Mrs. Felix warns that although the United States is supposed to be converting to metric measurement (and she is interrupted variously by indignant reminders that the U.S. is the only country so backward), her students will confound most U.S. listeners by answering in metric measures. She says, "The U.S. is inching toward that standard." Her pun goes unnoticed.

At the hour-and-a-half break, while others stretch and smoke, a Chinese mainlander asks what it means to "face the music." Mrs. Felix, the wife of economics professor David Felix, is thoughtful, then extremely careful in explanation, but neither she nor her writer-visitor can satisfactorily explain the idiom without falling into another.

"I've been looking for years for a dictionary of idioms that explains origins to help me explain meanings," she bewails. "I suspect 'face the music' comes somehow from a military situation, like being 'drummed out of the corps,' don't you?"

Her class resumes. It moves along swiftly, eased by her enthusiasm. What could be confounding and painful turns into fun. There are many small triumphs, some faux pas, much laughter.

In addition to formal classes, community volunteers tutor international students through a long-standing program coordinated by the international office. Once a match is made, student and tutor make individual arrangements, usually meeting once a week at Stix House.



Tomasz Semkoff and his wife, Christine, both doctoral students in chemistry, wistfully observe, however, that "no matter how hard you try or how long, you never lose your accent." Tomasz came to Washington University from Poland in 1978, seizing an

opportunity privately arranged for him. He and Christine, fellow undergraduates in Warsaw, had been married shortly before he left, and the following spring, she applied for a passport to visit her husband. When it was denied, she successfully reapplied. She arrived in May 1979—speaking no English—and has not returned.

After a summer of English classes at the International Institute, Christine took the Graduate Record Exam, passed, and was accepted as a graduate student. Her field is geochemistry and earth science; her husband's is radiochemistry.

"For us," says Tomasz, "it was not difficult to adjust to life here, but a great pleasure. We have gained so much personally, as well as professionally. We have become independent and mature."

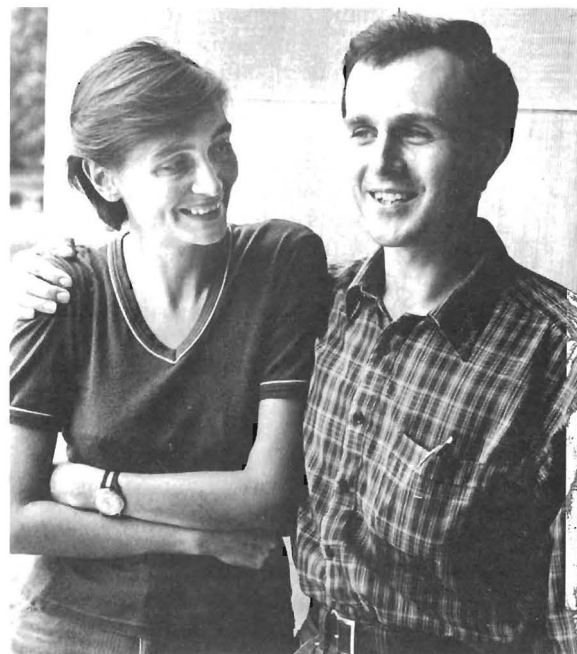
Tomasz frowns as Christine, whose English comes with more difficulty and whose hands fly as her emotions rise, tries to explain that her only disappointment in the United States occurs because she is too idealistic, because she believes that in a country that offers so much, all people should react perfectly.

Often the University's international students are already quite comfortable with English. Many graduate students have previously attended another U.S. university; many others come from cultures which are at least bilingual. Punita Singh, who this fall began graduate study in psychology, and her brother, Ina, who came last year to complete the engineering prerequisites for graduate study, have spoken Indian, Punjabi, and English rather "mix and match" since childhood. But, then, their father, Gurpreet (Pete) Singh, was equally comfortable as an international student at Washington University when he took the M.B.A. degree in 1954. The siblings are thoroughly cosmopolitan and suffer from only one major symptom of the foreign-student syndrome: difficulty with American food.

"That," says international office director Stone, "may be the one universal complaint among our students, many of whom are vegetarians." It is a special problem for students living in the residence halls; one that plagues the international office because its solution—to make the kitchen at Stix House available—is far from ideal. "Most students solve it by living in apartments, and frequently those who don't, simply ally themselves to a countryman who does."



More than a decade ago, the University's Women's Society, opened a closet-sized campus shop called "The Uncommon Market," to supply the twenty-pound bags of rice, the curries, the teas, and many other ingredients of international cookery difficult to acquire in St. Louis. Although the city's taste has expanded so that many of these items now stock supermarket



Christine and Tomasz Semkoff

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shelves and produce counters, the shop still provides an easy access for campus international pedestrians.

Autos, scarce among international students, are the ultimate U.S. luxury coveted by many. The husband of a long-time volunteer tutor, having successfully negotiated the purchase of a second-hand car from an acquaintance for a group of German students, offered his consultation to a similarly bent group of mainland Chinese. The students, however, found a "very cheap" car on their own and bought it. It seldom ran. When the German students were to return home, the Chinese contingent bought their good car. Their St. Louis friend believed that all's well that ends well, until he discovered that the clunker had been pawned off on another student collective.

Ina Singh, succumbing last summer to the car-buying temptation, did what any overseas student who can afford it does—he drove 6,000 miles through the Midwest, attending a University friend's wedding in Ohio and visiting in other states.

For many international students, summer presents problems quite apart from the general complaint about the St. Louis heat and humidity. The University offers no graduate classes. Research assistantships may continue, but teaching assistantships may not. And students generally cannot work off campus without seeking an exception to visa regulations.

Kala Seidu, an engineering student from Ghana, says that although visa exceptions may be granted, "getting an exception is one thing; getting a job is another." In today's tight job market, many do not find summer work. Kala accepts summer as an opportunity to spend the family time he cannot afford in a demanding academic year.

He arrived in 1978 for doctoral work in systems science and mathematics supported by his government. When he was settled, his wife and sons followed.

He says of his future, "I intend to return to Ghana, but I do not know the answer as to whether I will. My wife and I will decide when the time comes. The situation in my country is quite unstable."

Like a few other doctoral students' families whose residencies here are long, the Seidus realize that their sons are thoroughly Americanized. "The cultural difference between our country and yours, they will have to go through at home," Kala says.



Juan Arratia and his wife, Bensa Vera, however, are convinced of the wondrous adaptability of children. Their sons, ages nine and seven, arrived with them from Chile in fall 1981 speaking little English. They sent the boys to public school "where in two or three weeks they were fine," said Bensa. "For kids it goes so fast; they now correct our pronunciation, believing they speak better English than we do."

Juan, a doctoral student in electrical engineering, is on leave from his university post in Chile. Bensa holds a teaching assistantship in the department of Romance languages, where she also studies linguistics. Bensa's steady salary, paid in dollars, helps weather a persistent problem for some students: the fluctuation of their home currency against the U.S. dollar. "My salary is worth about half as much in dollars now as it was a year ago," says Juan. In two years, Juan and Bensa will return to university teaching in Chile.

Not all international students return to their homelands post-education. Perhaps questions of where they belong now and where their own countries stand, more than the lure of the affluent, "good" life in the United States, influence the "brain drain."

"They accept our values as ours. I think, but do not necessarily adopt them

as their own," says Bill Stone. From their fresh viewpoints, they pose questions about U.S. life which range from Ivy Chow's innocent: "I am shocked and I do not understand why Americans write on walls. Besides, I thought that Americans were so free to express themselves, there would be no need to write obscenities in closets." to Ricardo Navarros' strident, "Why are North Americans so acceptant of what their government does? They are brain-washed by the media. In my country (El Salvador) we are more used to social problems, and we learn from reality. It is hard for the government to deceive us because we are wary. I think because Americans are not dependent on others, they are personally isolationists," but, he says, "your government is not. It interferes." These are not necessarily criticisms; they are questions asked with a strong disposition to understand, but with some outrage.

Neither Ivy or Ricardo will go directly home. Ricardo, who will complete a doctoral degree in engineering's technology and human affairs this year, will work in Switzerland. "I cannot go home in '83," he says. "Maybe I can in '84." But perhaps not then either, he admits, because his outspoken criticism of U.S. involvement and of the Salvadorian government it supports is not, he says, an asset to be factored into an equation forecasting old age.



Wherever he goes, he must put his education (in El Salvador, at Purdue University, and at Washington University on a Laspau/Fulbright fellowship) to work for the good of humanity. "My goal is that of any human being: to work to develop a better world for everybody. My life is too valuable to work for money."

Ivy, on the other hand, is simply

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unsure of her place. "Hong Kong may not be British when the treaty expires in 1997," she says, "and, besides, I am Chinese by heritage; I hold a British passport; my parents live in Canada; and I study in America. Where do I belong?" She dropped out of high school, fed up with the intense competition of the college-prep track she had been programmed into. After working for seven years, she decided to return to school, but could not reenter the rigid Hong Kong system. Since her parents were moving to Canada and her sister was studying at Washington University, she applied for undergraduate admission here and was turned down. She took a freshman year in St. Louis at neighboring Fontbonne College. Her academic performance there won her admission to Washington University last year. She is now a junior in business. "And I love it. After all those years of working, studying is pure pleasure. Maybe I spend more time because English is not my native language, but when I came I forced myself to live with American students. You see, if I make mistakes now, you won't correct me, but people you live with will."

Despite her cosmopolitan background, she finds her oriental mindset accounts for some minor dysphoria. "You see," she explains, "in Chinese, I would never say, 'I love you.' The words are there, but we don't use them. And I still struggle with myself to give my name. I talked with Professor (Stanley) Spector for a long time recently without telling him my name. I didn't because I felt I wasn't worthy of being remembered as an individual."

That Ivy would approach Professor Spector may be a sign of how Americanized she is. "We frequently must let students know it is all right, even expected, that they challenge a professor," says Stone. "The more formal the society from which they come, the more difficult it is to accept

the informality of our society. There are problems of acculturation, even though our students are, for the most part, fairly sophisticated. We like to think our support system also is fairly sophisticated. The fact that the University is willing to set aside Stix House for its international community is a measure of its commitment."

Within that space, many international students find a home base. The living room is almost always occupied by informal groups. The basement recreation room is much used. The halls often have students chatting among themselves as they wait to talk to one staff member or another. Everyone has a ready ear to listen to troubles.

And troubles there are, but often the same troubles that confront U.S. students—housing, food, academic schedules, finances, homesickness.

"Maybe homesickness is worse because of the distance," suggested one student.

"And money from home doesn't always come as steadily as you would like," says another.

"But, in a way," mused a third, "at Stix House international students have more support than many unidentifiable groups of students. We're very lucky."



Support networks abound. Two groups welcome international-student wives (and, infrequently, husbands) and provide peer-group activities. The international office handles a program to match students with about a hundred St. Louis families who occasionally invite the student to dinner or to share in family activities. Diane Hasty, who coordinates the host-family program, says it gets rave reviews all around, but she needs more families. Every Tuesday for the past several years, a consortium of seventeen Baptist churches has served free lunch at Stix House (usually to

more than 200 international students and a few American friends). The students themselves cook a nominally priced Sunday supper once a month. The Women's Society still sponsors some activities for students and families. And St. Louis's international community, as well as University academic departments, use Stix House for parties and receptions that cater to international students. In addition, quite apart from the University's effort, several St. Louis churches host activities for the international student community.

At least partly for these reasons, the attrition rate for these students is surprisingly low. "But," said one, "perhaps that is more because international students have fewer options. The academic program is very demanding and I think we are very serious."

If Washington University's name is not as well known abroad as the people of Stix House would like it to be, they are working on that. "We have good contacts with many embassies and sponsoring agencies," said Stone, "but often our students hear of us through personal networks—an uncle's friend's son went here or the business associate of a friend's father. Our international faculty is also a very helpful factor." Recently, the office formed a student admissions committee to answer inquiries, send aerograms twice a year to interested students, and generally work toward making the University better known to prospective international students.

"I came to Washington University," said Kala Seidu, "because it responded to my inquiries quickly and thoroughly, and because it is in the middle of the country. That's helpful to getting around, if you have the money to do that. But its reputation as a good engineering school is well known in Ghana, and that is why I first inquired."

"That," says Stone, "is the bottom line. We have a good product to sell."

Custard's Last Stand

*The north woods had Paul and Babe, the frontier had Davy and the bear;
urban St. Louis has Ted and his frozen custard.*

Ted Drewes, the frozen custard king of St. Louis, is as full of wholesome goodness as the product he makes, advertises, and sells. He is, he says, a successful small businessman who believes in doing what you do well. "I think it doesn't matter what your occupation is, but how well you do it. What do you think?" he asks. And he waits for an answer.

He does not own a boat or a lakeside vacation home. He does not belong to any country clubs. "If I got mixed up in that, I'd forget who I was," he explains. In fact, he doesn't have an office, a secretary, a receptionist. He meets salespersons, prospective employees, guests in the back room of one of his two South St. Louis frozen custard stands, where the action from the front spills over as one teenager or another fetches a can of frozen strawberries or another tub of custard from vintage freezers. In the front room, a dozen kids wearing several varieties of Ted Drewes tee-shirts and visors work with a hustle and a shout. It appears to be chaos; they find order.

In season—from March to October—business is never slack, but has daily cycles, so the young people open and close the eight or so narrow screened windows as needed and in off-moments grind pecans by hand or make up extra concrete malts against the peak evening traffic. A "concrete" is three scoops of custard and flavoring—fudge, frozen strawberry, fresh banana, or other fruit—mixed for about three seconds by holding the deep cup up to a shake mixer. It gets its name "because you're supposed to be able to turn it upside down and not have it fall out," says Drewes, demonstrating with a chocolate chip concrete he has just mixed. "It's our best seller."

"Some people think we have a monopoly on frozen custard, but we don't. There were dozens of frozen custard

stores in St. Louis in the thirties and they all passed on. I don't think we're custard's last stand, but we do have custard's finest stands."

Drewes's stands are throwbacks to another era, but rather than spend money on fancy decor, he spends it on advertising or a public relations promotion—although he doesn't differentiate between the two and handles both himself. He and a daughter write the ads. "I spend most of my advertising budget on radio, community newspapers, and promotions. I use radio because I figure many people who hear it are in their cars going somewhere and could come here. Whereas the people who watch television are sitting at home. If I were selling soap or beer or something consumed at home, I'd advertise on television." Not all of Drewes's savvy is homespun, but much of it is.

"I believe in advertising. Not doing so is a mistake many small businesses make. It's hard when you're grossing \$10,000 to spend \$300 on advertising, but I looked at what somebody I wanted to

emulate was doing. Since they were here, I looked at Anheuser-Busch. I took the number of barrels of beer they were producing, guessed what they were selling in dollars and what percent of that they put into advertising—3 percent of gross sales, as it turned out, was my educated guess. My budget fluctuates around that number."

Drewes grew up in Pine Lawn, a north St. Louis community just beyond the city limits. An excellent student at Normandy High School, he entered Washington University in 1946, an eighteen-year-old among hundreds of returning veterans. He believed he would study law, but finding law was not his thing, elected economics as a major. He had no intention of entering the business his father had established in St. Louis in 1930. "I really didn't make good grades, but it was rough then. Those guys were mature and some of them were determined. But, then, I didn't work hard either. I went out every night and did enough to get C's and B's. Looking back, I think I wasn't a good



Ted Drewes, AB '50

test-taker. One professor took off one point for a blank on a true-false test and two for a wrong answer. I analyzed my tests and found I wasn't even coming out even by guessing, but you know, I just couldn't stop myself. I really learned a lot about life by taking liberal arts, and what I learned about economics has stood me well."

When Drewes graduated, the Korean War was on and he was in the naval reserve. "I just couldn't convince prospective employers that I wasn't going to be called up, so I started for my father." Before long that challenge had him hooked. Besides, he had married the equivalent of the girl next door and had begun a family.

"The business wasn't doing very well, actually, we were going broke. My father was a good businessman—he was one of those people who could tackle any problem and find a solution by common sense without knowing the technical stuff—but he was more adventuresome than I am."

After Ted joined the business, he and his father found an off-season complement in Christmas-tree sales. They asked around to learn where the best trees were coming from and then headed to Nova Scotia to see what they could buy. "At first, while he was buying up there, I was back here setting up locations, so I didn't go along until 1960. Then watching him taught me a lot. His ability to get along with and influence farmers was remarkable.

"One of the things he just set his mind to and figured out was shearing trees. He started the whole thing and now millions of sheared balsam firs are cut and shipped from there. Before they'd just cut them from the wild, and they were good trees, but he figured out how to make them better. He'd get out of the car with shears in hand, go up to a farmer just to talk for a while. Then he'd pick out the ugliest



tree close at hand, shear it, and tell the farmer that by doing that as it grew, he'd turn it into a 'merchantable' tree, as they say in Nova Scotia.

"After Dad died, tree farmer Homer Varner said to me, 'We're now going to cut the memorial tree.' With great ceremony, he cut the tree I'd first watched my dad shear. That happened again with another grower and I was really moved."

Drewes spends November in Lunenburg county, Nova Scotia, shipping 10,000 trees from 500 acres he accumulated gradually. "People say now, 'Boy, you were smart to buy when land was cheap,' but I want you to know that buying land kept us poor for years." If, as his son notes, the senior Drewes established the business, Ted, Jr., has brought it to prosperity. His secret, he says, isn't one. "You see, I think these places run well because I'm here. So even now, I'm here much of the time. I know what's happening: what's going right and wrong; who's caught on and



who hasn't." He believes in selling a good product without compromise—the recipe hasn't changed much in fifty years—and hiring good help and keeping it. Most of the sixty or seventy teenagers he employs began the job when they were in high school. "They're almost all good students, but I think that's because to work twenty hours a week during school, you have to be organized. I don't pay them exceptionally well at first, but I do give them raises for good work. And there's a premium on workers who can serve the public for hours at a time in a rush."

Several years ago, Drewes read up on tax law and began a college-level educational benefit program. Veteran employees who continue to work for him during the summer and half-time during the school year receive a benefit for post-secondary-education tuition. The amount is being raised this year to \$2,000. "I figure it helps everybody: them because it's not taxable, me because I keep good workers, and local colleges and universities because they get good students.

"If I've learned anything in business, it's not to take what experts say as gospel. I wouldn't say I'm well read, but I've always read a little every day and applied it to my own operation."

"But look at me. I never fill out those things that ask you to let your classmates know what you're doing. What am I to say: forty years later, I'm a soda jerk." He moved aside for a young woman who'd come in to get to the freezer. "She's a junior at St. Louis U.," he said with obvious pride. Then to her, "What do you put as occupation on your tax return?"

"Oh, Ted," she said, "I put soda jerk once, but I don't now. I don't want the IRS computers to flag my return for audit for some silliness."

"See," he smiled, "I told you all my kids were smart."

BILL PHILLIPS: Reagent

by Dorothy A. Brockhoff

The Norfolk Island pine that a mover tenderly tended as he and his cargo rumbled from Wilmington, Delaware, to St. Louis five years ago is thriving in a spacious, sunlit office in McMillen Laboratory at Washington University, and so is its owner, Bill Phillips.

It and a twin now flourishing at the Phillipses' University City residence sprouted from seedlings in the family terrarium. Now the towering office evergreen and its imposing neighbors—a fig tree and a rubber plant—almost touch the ceiling.

When William Dale Phillips, the Charles Allen Thomas Professor of Chemistry and chairman of the department, joined the faculty in 1978, he looked after the plants himself, but as his responsibilities escalated, he yielded to the entreaties of his secretary to let her "shuffle the papers, fetch the coffee, and water the flora." Phillips, a tall, genial man given to smoking a dozen Garcia & Vega Elegante cigars a day, works at a walnut desk girded with precisely carved alchemic symbols. The desk belonged to the late Charles Allen Thomas, a chief executive of the Monsanto Company for many years and trustee of Washington University, whose family generously gave it to the University after Thomas's death earlier this year.

While serving as chairman of the University's board of trustees, Thomas contributed \$600,000 to establish the professorship which bears his name. Subsequently, he helped persuade Phillips to forsake industry to become the first occupant of this chair.

That was not an easy task because Phillips, then fifty-two, was reluctant to resign from E. I. du Pont de Nemours & Company, which he had joined in 1951 immediately after receiving the doctoral degree in physical chemistry from Massachusetts Institute of Technology. As an eminent du Pont researcher for more than a quarter of a century, his work earned him election to the National Academy of Sciences.

His ambivalence prompted him to reject Washington University's first invitation to join the faculty, and only after Thomas, and, in turn, Chancellor William H. Danforth implored Phillips to reconsider, did he agree to come. Asked why he changed his mind after refusing comparable offers from many other prestigious institutions, Phillips said with a chuckle, "You just can't say no to Bill Danforth."

Danforth responded with characteristic modesty,

"I only wish that were true."

Those who invited Phillips here have not been disappointed, but some, quite frankly, have been astonished that he has accomplished so much so quickly. Nor has his influence gone unnoticed by the humanists on this campus. Phillips appreciates their importance and has said that the University's commitment to the traditional humanistic studies was a factor in his decision to accept the post. He deplores the governmental cutbacks in the support of the humanities whose losses are even more drastic than those suffered by the sciences.

Such candor has led some to describe Phillips as "a man who shoots from the hip." But Luis Glaser, Ph.D., professor and head of the medical school's department of biological chemistry, dismisses this view as nonsense. "Bill Phillips," he said, "will tell you exactly what he thinks about whatever it is you are discussing. He never, however, responds impetuously, but only after careful reflection."

Phillips, who holds a joint appointment as professor of biological chemistry at the School of Medicine, is viewed as a bridge builder. He is a leader who, with support from the movers and doers in engineering and medicine, as well as in the physical and biological sciences, is helping to point the University in new directions.

One such development is the establishment of a new Center for Biotechnology. A little over a year ago, Phillips, James M. McKelvey, dean of the School of Engineering, and Rodolphe L. Motard, chairman of chemical engineering, recommended to the chancellor that such a center be created. They stated: "We have in biotechnology an inter-disciplinary field whose time has come."

Eric Hutton Dunlop, Ph.D., a thirty-six-year-old Scottish chemical engineer, joined Washington University and the center last spring. Like Phillips, he left an important industrial position to accept an academic appointment. He is now professor of chemical engineering. Having helped initiate the "new science" in a \$100 million plant in England built by Imperial Chemical Industries, Limited (the British counterpart of du Pont), Dunlop has the know how to extend the industrialization of biotechnology in the United States. The modern processes employed by ICI in England and at other such plants around the world took as their starting point biotechnology principles that date back at

William Dale Phillips, a man impatient with "hype," is uncomfortable at center stage. He considers himself a collaborator rather than a commander; nonetheless, his accomplishments since he joined the faculty in 1978 have astounded even those who invited him to campus. Candid and forthright, he is viewed as a bridge builder who has fostered new interdisciplinary connections while also encouraging improved cooperation between town and gown. The results have been explosive—leading the University in new and exciting directions.



least a half century to when scientists first realized that specific microorganisms could make useful products by fermentation.

This work complements research that Phillips himself was involved in from 1974-76 as technical director of a joint venture in England between duPont and Ranks Hovis McDougall, a major United Kingdom food company. "The time I spent abroad was completely fascinating," he recalled. "Our purpose was to design and develop an American-British facility that would employ microbiological methods to convert cornstarch into protein for human foodstuffs. Sir Ernst B. Chain, the co-developer of penicillin, helped us select the fungal strain that we used. But our proteins cost too much at the time to be practical and in 1976

DuPont withdrew from the venture," he explained. "These economic facts of life are going to be re-learned by many entering the biotechnology field today," Phillips predicted.

But much of what was economically unfeasible then, now makes sense. Nonetheless, Phillips and others here believe that the phenomenon of fermentation is still being neglected because of preoccupation with the more glamorous developments in genetic engineering. He and his colleagues hope that a new center here can perfect purification and separation processes that make fermentation a more viable technique.

He advocates freeing the United States of its dependence on petroleum imported from the Middle East by using biotechnology to produce

Bill Phillips: Reagent

fuels, chemical feedstocks, and specialty chemicals. Phillips does not see biotechnology as a panacea, but rather as one of the alternatives to improving this country's economic condition.

Philip H. Abelson, editor of *Science*, an influential publication issued by the American Association for the Advancement of Science, sees indications that feedstocks from substances other than petroleum are slowly winning acceptance. In August, he observed "an increasing fraction of alcohol is coming from grain, and some of it is being used in gasoline in an application other than gasohol. Some oxygenated organic compounds, including ethanol, increase the octane number of gasoline and thus serve as a substitute for tetraethyl lead."

Phillips stressed, however, that while the Center is focusing much of its attention on these measures, it also will be exploring the potential of genetic engineering, a phrase that has become a household word in recent years. This revolutionary type of biotechnology has provoked a frenetic scramble by both academic scientists and industrialists to develop organisms with altered biochemical potential capable of producing materials of commercial interest.

Phillips estimated that at least 300 companies are racing to marry disparate genes in order to produce modern miracles they can successfully funnel from the laboratory bench to the marketplace and, in the process, turn a fabulous profit. So far, however, this eagerly anticipated bonanza in biotechnology has not materialized. "It will come," he predicts, "but not before the vast majority of current biotechnology companies have filed for bankruptcy."

Writing in *The New York Times* recently, reporter Tamar Lewin, observed: "Although new companies with names like Amgen and Genex have sprung up to explore the commercial possibilities (of this area) of biotechnology—and most of the largest pharmaceutical and chemical companies are showing an interest, too—the only commercial product of genesplicing to come to the market so far has been a European vaccine against diarrhea in piglets."

The potential, however, is there. While forecasters are busy inventing extravagant terminology to describe what many predict will be a twentieth-century nirvana, the effort to produce the first major domestic products for manufacture and

approval by the Food and Drug Administration continues unabated.

Lewin summed up: "In years to come, scientists and industry analysts expect the market to be flooded with everything from bioengineered microorganisms that can mine and gobble up oil spills to a specialized cancer therapy that will deliver treatment only to the cells affected."

For a number of reasons, however, Phillips believes that most of the firms engaged in genetic engineering are destined, like Francisco Pizarro, never to reach the coveted pot of gold, but some undoubtedly will. To improve their chances in exploring this vast area, companies are teaming up with universities that are regarded as leaders in basic biomedical research. In 1981, Washington University and Mallinckrodt Company signed what was at the time the nation's largest university-industry agreement totalling \$3,881,250 for hybridoma research. It involves fusing the products of two cells of different genetic types into one so that, for example, an antibody that recognizes a particular type of cancer cell would be linked to something that diagnosis or kills such cancer. Ironically, the British, who did the first hybridoma experiment, thought that it had no commercial application and did not even apply for a patent. Joseph Davie, Ph.D., M.D., head of the department of microbiology and immunology, is the primary investigator of this project that is expected to be useful in such other areas as immunology, heart disease, blood clotting, and infectious disease.

Earlier this year, Monsanto Company and Washington University signed a \$1.5 million contract also focused on hybridomas. More recently, they entered into another contract, not specifically related to biotechnology but part of the broader area of biomedical research. Under terms of this five-year agreement totalling \$23.5 million, the University will undertake individual research projects carried out by cooperative arrangements involving researchers from the medical school and Monsanto. The focus of these projects is on the proteins and peptides that modulate cellular functions. David Kipnis, M.D., Adolphus Busch Professor and head of the John Milliken Department of Medicine, will direct this program and serve as chairman of its advisory committee.

Phillips played an important role in securing the Mallinckrodt contract. But he stressed that it was

Phillips confers with Burton E. Sobel, M.D., professor of medicine and director of the cardiovascular division at the medical school, about the use of nuclear magnetic resonance (NMR) imaging as a new tool for diagnosing some types of heart disease.

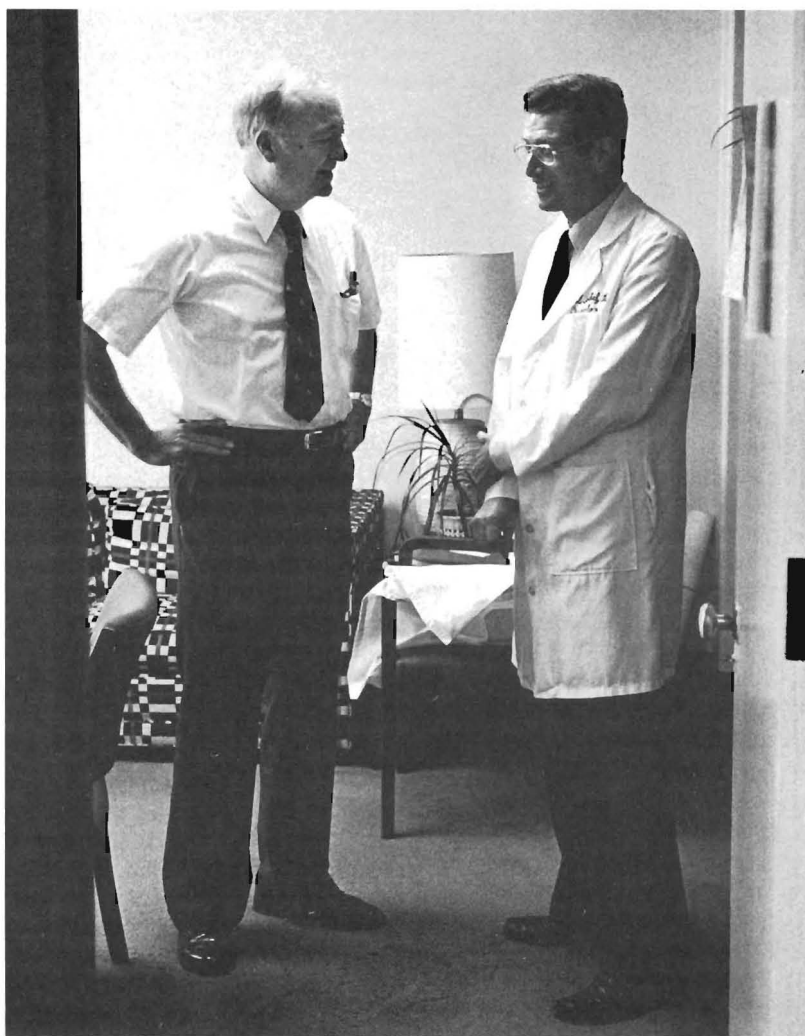
Ed (Edward L.) MacCordy, associate vice-chancellor for research, and Davie who hammered out the final details of all three agreements during the day-to-day negotiations. And Davie, in tandem with Kipnis made sure that traditional University values were protected. Their input enabled Washington University to draw up contracts that are widely regarded as models.

Phillips also heads a University-wide ad hoc committee that is studying the news ties between town and gown. He is knowledgeable about both having had experience in each sector. Because of his expertise in this broad area, Danforth asked Phillips to serve as his representative at the Pajaro Dunes, California, Conference on university-industry interaction and the need to preserve academic freedom so that scholars on campus can pursue their research unshackled by constraints imposed by those not part of academe. He will serve at another such conference in December at the University of Pennsylvania. Phillips believes that government support must be bolstered if this country is to continue to be one of the world's leaders. "If we don't find ways to finance basic and applied research, I fear that in ten years we may become a second-class nation," he stated.

While these negotiations have been in progress, Phillips, Dunlop, and colleagues from the departments of chemical engineering and biology and the School of Medicine have organized a new course titled "Special Topics in Biochemical Engineering and Industrial Biotechnology" taught by an interdisciplinary faculty. Introduced this fall, it is the first of a cluster of courses that will be offered by the center.

While Phillips has played a key role in all of these developments, he somehow also finds time for other equally important and exciting projects. One of these, nuclear magnetic resonance, is a topic that has been of continuing interest to him throughout his long career, first at du Pont and now at this University. Scientists call it NMR, a handy abbreviation for a phenomenon discovered simultaneously by Edward Purcell at Harvard University and Felix Bloch at Stanford University. They subsequently shared a 1952 Nobel Prize for their work.

Phillips, a pioneer in the development of NMR, describes it as an "incredibly useful tool for determining the structures and dynamics of mole-

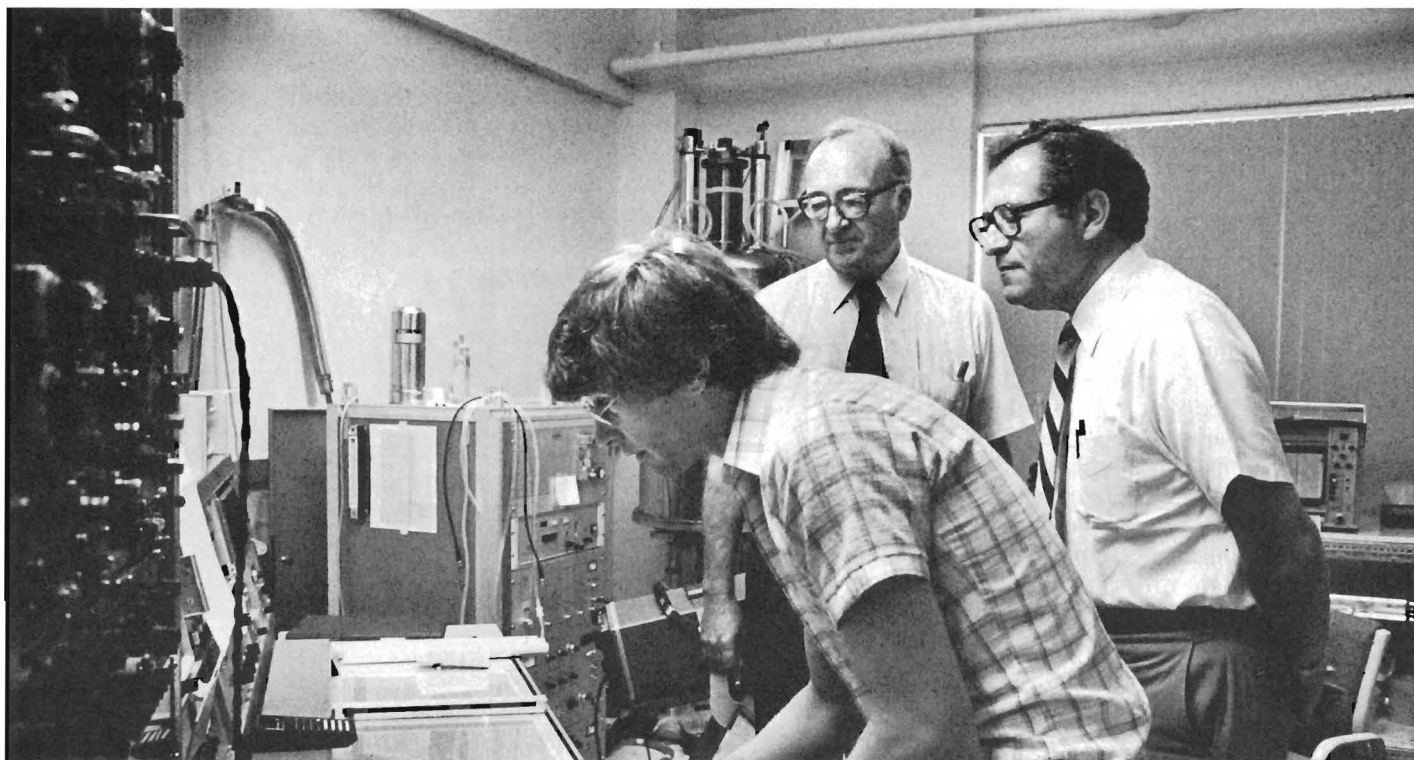


cules. I was fortunate," he explained, "to get in early and skim some of the cream off this field. It was an exhilarating experience that doesn't happen often to a scientist. It was so exciting, I found myself working nights and weekends—in fact, I really didn't want to stop. One gets these highs in science only occasionally or maybe not at all."

Among the seven new faculty members who Phillips has recruited to strengthen a department of chemistry already well-established in its tradition of excellence is Joseph J. H. Ackerman, Ph. D., assistant professor of chemistry. Ackerman has developed a new way to use NMR spectroscopy for the study of in vivo biochemistry. He explained that NMR had been used primarily to provide insight into molecules. During the past decade, however, scientists have discovered that NMR can be used for medical diagnosis. They have realized that NMR can help understand metabolic processes in specific organs without having to use invasive techniques such as biopsy. Much of this work is still in the experimental stage, but it and a new, related technique called NMR imaging show great promise. Phillips emphasized that the interest and support of David Kipnis has been crucial in the establishment of a biomedical NMR facility at

Bill Phillips: Reagent

Phillips and David M. Kipnis, M.D., Adolphus Busch Professor and head of the John Milliken department of medicine, look over the shoulder of Keith R. Thulborn, a postdoctoral research fellow in the department of chemistry and a second-year medical student, as he analyzes nuclear magnetic resonance (NMR) data at a laboratory at the School of Medicine.



Washington University. He further noted that it is the opportunity of working with such people as Kipnis that makes Washington University the exciting place it is.

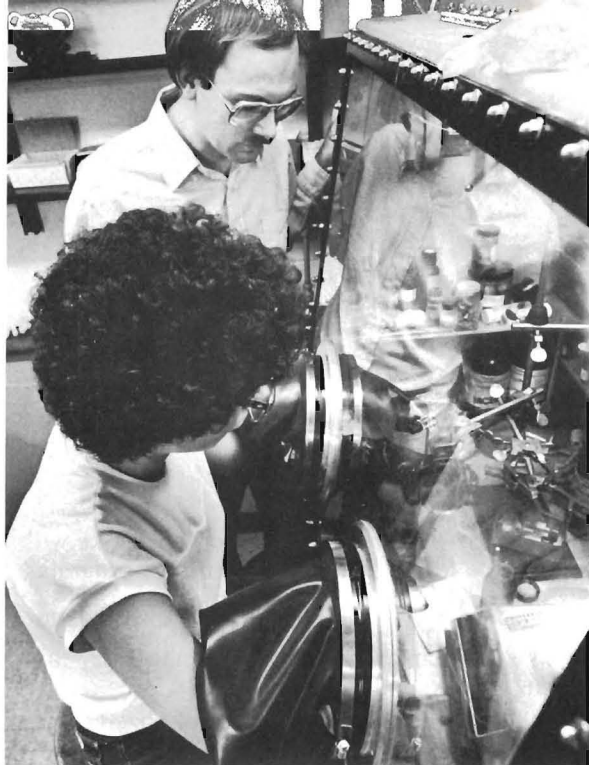
New NMR scanners use magnetic fields and radio frequency to produce two- and three-dimensional pictures of specific internal organs. Researchers use these photographs to understand physiological processes without known risk. NMR imaging can perform such feats because spacial and chemical information can be derived from tissue, organs, or whole bodies placed in a magnet. An NMR scanner utilizes a very large magnet and radiofrequency measuring devices to monitor what happens inside an organ or a patient. Married to a computer that analyzes slices through the subject, it produces high-resolution television images that enable scientists to understand the chemistry of specific diseases. An imaginative *Newsweek* writer recently stated: "These gigantic magnets set the very atoms of our bodies vibrating, skaking loose their chemical secrets." Phillips dismissed this observation "as so much hype" and substituted his own evaluation of NMR. "It is providing us with exceedingly powerful new tools

for studying biological processes," he stated emphatically.

One of these multimillion dollar NMR instruments is expected to arrive in St. Louis next summer. Another NMR scanner that does both metabolic studies and spacial images is being built by Bruker Instruments Company in Germany. Washington University is also considering acquiring this machine, the only one of its kind in the world.

Ronald G. Evens, M.D., Elizabeth Mallinckrodt Professor, head of the department of radiology, and director of Mallinckrodt Institute of Radiology, is trying to find space for these instruments. His search is not easy because in operation, they interfere with the performance of other diagnostic instruments in the Mallinckrodt Institute. "Ideally," he joked, "we would like to place them in a large wooden building in the middle of Forest Park, but that, obviously, is impossible." Meanwhile, Richard W. Gross, M.D., assistant professor of medicine, and others using Mallinckrodt's current scanners, frequently pick up radio waves of a local disc jockey instead of NMR signals.

Gross decided a few years ago to delve more deeply into the study of chemistry, and with



John R. Bleeker, Ph.D., assistant professor of chemistry, last summer directed a new competitive undergraduate research fellowship program funded partially by the department of chemistry and partially by Monsanto Company. He and Patricia A. Bell, now a junior at Northeast Missouri State University and one of six students selected for the project, synthesize air-sensitive organometallic complexes in an inert atmosphere drybox.

Phillips as his mentor completed studies for a doctoral degree in this subject after having already earned the M.D. degree and finishing his training as an intern and resident. He and Burton E. Sobel, M.D., professor of medicine and director of the cardiovascular division, believe that NMR imaging will be a valuable new tool in diagnosing some types of heart disease. Using it, they hope to cut the mortality of patients with coronary artery disease who are at risk of dying suddenly. Sobel explained that after conducting collaborative studies with Peter E. Corr, Ph.D., assistant professor of pharmacology, they now theorize that people with this problem build up abnormal amounts of certain chemicals that are either rapidly washed away or metabolized by normal hearts. "When these substances accumulate in a patient with the low blood flow associated with coronary heart disease, we suspect that they derange the membranes of the heart muscle cells and that, in turn, cause the chaotic rhythms that result in death. Up until now, we have lacked the precise methodology to test sophisticatedly our hypothesis.

"With NMR and help from Phillips, we hope to study the compounds we suspect cause this problem and eventually develop a lifesaving pill to inhibit their accumulation in patients suffering from this kind of heart disease." For this reason and many others, NMR is being hailed as a technique that quite literally opens a window into the body.

Although NMR is an area that Phillips knows intimately, he also gets excited about developments on other scientific frontiers. Working with others at the University, including some talent he has brought here, he hopes to establish yet another major research center on this campus. It will focus, he explained, on lasers and will explore their "great future both in science and in industrial applications."

One of those in the forefront of this work at the University is Dewey Holten, Ph.D., assistant

professor of chemistry, who earned his undergraduate degree here and returned after finishing his doctoral and postdoctoral work on the West Coast. Holten's research group uses special types of lasers to study very fast chemical and biochemical reactions. These lasers produce pulses of light which have a duration of only several picoseconds (about a trillionth of a second).

Using these ultrashort laser flashes, Holten and his colleagues are investigating the earliest events in photosynthesis. They hope to learn on a fundamental level how chlorophyll and related pigments in bacteria and plants utilize sunlight to produce the fuel necessary for their survival, and ours. The basic knowledge they gain may be used eventually to make artificial solar energy conversion more efficient, but applications in this marketplace are several steps removed from the experiments going on here. On this campus, the focus is on fundamental research involving a strong collaboration between biochemists who isolate and purify samples from photosynthetic organisms and the chemists who use lasers to study them.

Phillips encourages Holten and the rest of the chemistry department to pursue their research interests independently. A believer in delegating responsibility, he fulfills his many campus obligations while, somehow, also finding time to serve as corporate consultant and director to several firms and as an active member of many governmental committees. The pace is sometimes frenetic, but his organizational ability and his talent for ferreting out exceptional young scholars enable Phillips not only to survive but to thrive. The schedule, however, leaves him little time for hobbies like cruising down the river on the boat he also brought to the Midwest from Delaware or for piloting airplanes—once a favorite diversion.

To keep all of these projects in perspective and implement those that are envisioned takes a special kind of person. Phillips is that person, according to those who work most closely with him. Perhaps Sobel expressed it best when he said: "What I would like you to include in your commentary is precisely why those of us working with him find him such a delight. There is a very good reason for that. We all recognize that there are a lot of bright people in this world. But there are very few of them who manage to be both enthusiastic and visionary without going off the wall."

Comment

It was an early fall afternoon. The sun slanted through the west windows of the Women's Building lounge behind the five faculty members who would lead a discussion of the place of the humanities in the university. The event was the second of a three-session symposium on technology and the humanities convened by the Council of Students of Arts and Sciences. It had opened the previous day when William Bennett, chairman of the National Endowment for the Humanities, delivered the University's Wednesday Assembly lecture.

Bennett suggested that since none of us could turn back the clock to live without technology, each individual must decide how to live at peace with technology. He pointed out that technology itself is morally indifferent and that humanistic study was not, itself, "the holy gospel, even with a small 'h' and 'g.' The humanities do not even give a single vision, but present a great *sic et non*."

"What question would you address? War? Would you turn to Erasmus or Homer? Sexual fidelity? Would you turn to Tolstoy or Joyce? The proper organization of society? Would you turn to Marx and Lenin or James Madison?"

He said he believed, "Technology helps us deal with the means of life; humanistic study helps us deal with the ends of life... Through technology we will live longer and more comfortably, but questions of value and meaning in our lives belong to the humanities." Only the humanities, he said, will help us deal with the central question: how to use our time. Will we play Pacman or talk together?

Since their discussion was to focus on the university, panel members—Max Okenfuss of history, Danny Kohl of biology, Robert Leventhal of German, James Jones of French, and William Gass of philosophy—first dealt with the place of the humanities in university education today. Each in turn and with

an individual perspective emphasized that in this century, the sciences—and their byproduct applied science or technology—had usurped the central place occupied by the humanities since Aristotle. Gass quipped that if philosophy was the mother of all, as soon as her children had figured out who they were—as soon as a discipline really knew what it was about—he'd like to say she kicked them out, but in reality, most left in a huff. His metaphor brought an appreciative chuckle.

The discussion then settled into an examination of the value of humanistic study if one accepted the premise that such study did not provide marketable credentials—which Okenfuss reminded had never been the case and Kohl said, nevertheless, the sciences were perceived to do. "The notion is accepted," Kohl said, "that the sciences at least provide a more ready entry into the technical education that will get you a job: specifically, most students believe that a biology major enhances the prospect of getting into medical school." Despite that fact, he observed, "The fancier the medical school, the louder it now proclaims that it is looking for poets rather than biologists."

Jones suggested that in today's university, humanistic study offers an oasis. He insisted that no student should be allowed to decide on a course of study without being fully aware that for most, these years would be the last period of time during which an individual had the leisure to explore perspectives. Leventhal elaborated that technical education could bring mastery, but that humanistic study alone could bring the ability to ask critical questions and explore answers.

A young man who identified himself as premed said that was exactly why he was a student of the classics. He felt that in science he would face as many moral as scientific questions and "although I could get up every morning to face these alone, great minds have done so before

me and I need not constantly try to reinvent the wheel."

Okenfuss and Leventhal spoke with fervor of the importance of programs here and elsewhere that integrate disciplines and urged that the University marshal the resources necessary to expand these.

A young woman emphasized that cross study between science and the humanities was most needed. "I'm taking a biology major and an English minor," she said. "And I'm frightened by my colleagues in biology who are going away without the humanistic study that might help to confront ethical questions."

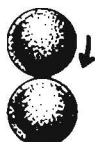
In summary, Kohl said, "I learned a long time ago that it is not graceful to be brave on someone else's time—and I have a job I love, all of us on the panel do, I think—so while I'm reluctant to press my viewpoint, it seems dreadfully wrong for a student to emerge from a university without having studied the humanities. Students ought to explore. If it turns out that the time spent exploring is at the expense of learning something practical, it's probably a chance well worth taking."

And Gass said not to forget that the converse situation was also true: that he found more often his scientist friends knew Hegel, than his humanist friends knew science. "We must start saying to students in the humanities that they must study science—not because it is impossible to get a job without technical skill, because it is not, but because it is impossible to live as an ethical being in this technological world without understanding science."

Three afternoons of talk. No answers; only interesting important discussions because, as an audience member proposed, "The sciences and the humanities have more in common than they think and it is not necessary to make a choice between them. But if we talk of a dichotomy long enough, we will begin to make it true." D.L.W.

Open Letter to Readers with a Mathematical Bent

As the top ball rolls down from the position shown, at what point does it lose contact with the lower ball?



The areas of the three cylinders meet in the middle and are mutually perpendicular. If the radius of each cylinder is 1, what is the volume of the region common to all three?



Solution to 3 Cylinders Problem

Let R be the common radius of the three cylinders. In rectangular coordinates centered at the intersection of the three axes, the region inside all three cylinders is described by

$$V = \{(x, y, z) : x^2 + y^2 \leq R^2, y^2 + z^2 \leq R^2, \text{ and } x^2 + z^2 \leq R^2\}$$

(1) Let V_0 be the intersection of V with the octant of points x, y, z where x, y , and z are all ≥ 0 . By symmetry,

$$\text{vol}(V) = 8 \text{ vol}(V_0)$$

(2) Let $V_1 = \{(x, y, z) \in V : x \leq y \leq z\}$
 $V_2 = \{(x, y, z) \in V : x \leq z \leq y\}$
 $V_3 = \{(x, y, z) \in V : y \leq z \leq x\}$
 $V_4 = \{(x, y, z) \in V : y \leq x \leq z\}$
 $V_5 = \{(x, y, z) \in V : z \leq x \leq y\}$
 $V_6 = \{(x, y, z) \in V : z \leq y \leq x\}$

Then V is the union of V_1, V_2, \dots, V_6 and by symmetry, V_1, V_2, \dots, V_6 all have the same volume. In particular

$$\text{vol}(V_1) = 6 \text{ vol}(V_0)$$

(3) In cylindrical coordinates $x = r \cos \theta, y = r \sin \theta$, V_0 consists of the points (r, θ, z) where $0 \leq r \leq R, 0 \leq \theta \leq \pi/4$, and $0 \leq z \leq r \sin \theta$. Since the volume element in cylindrical coordinates is given by $r dr d\theta dz$

$$\text{vol}(V_0) = \int_0^{\pi/4} \int_0^R \int_0^{r \sin \theta} r dz dr d\theta = \int_0^{\pi/4} \left(\int_0^R r^2 \sin \theta dr \right) d\theta = \frac{R^3}{3} (1 - \cos \pi/4) = \frac{R^3}{3} (1 - \frac{\sqrt{2}}{2})$$

(4) Combining (1)-(3), $\text{vol}(V) = 48 \text{ vol}(V_0) = 16R^3 (1 - \frac{\sqrt{2}}{2})$

show

$$= R^3 (16 - 8\sqrt{2})$$

(approx) $= 4.68629 R^3$

θ = angle at which top ball leaves (flies off the bottom ball)
 m = mass of the top ball

1. When top ball falls down to its final position its entire mass drops by an amount $(2r)(1 - \cos \theta)$. Therefore its kinetic energy increases from 0 to $mg(2r)(1 - \cos \theta)$

2. This kinetic energy is distributed into linear kinetic energy $\frac{1}{2}mv^2$ and rotational kinetic energy $\frac{1}{2}I\omega^2$, where I , the moment of inertia for the top sphere, is $\frac{2}{5}mr^2$. But $\omega r = v$, the velocity of the center of mass of the sphere.

3. Thus $\frac{1}{2}mv^2 + \frac{1}{5}mv^2 = mg(2r)(1 - \cos \theta)$

Therefore

$$(1) \quad \frac{mv^2}{2r} = \frac{10mg(1 - \cos \theta)}{7}$$

note $\frac{mv^2}{2r}$ is the centrifugal force making the top sphere try to fly off the bottom sphere

4. The force holding the top ball onto the bottom ball is the component of gravity in the radial direction, which is

$$(2) \quad F = mg \cos \theta$$

5. Forces (1) and (2) balance when the top ball leaves the bottom ball. This balance gives

$$\cos \theta = \frac{10}{7}(1 - \cos \theta)$$

or $\cos \theta = \frac{10}{17}$ or $\theta = \arccos \frac{10}{17}$ / answer

To give readers a standard by which to appreciate the William Lowell Putnam Mathematical Competition (won by Washington University's team three times in the past six years), the summer issue of the Magazine presented two problems similar to those on the Putnam. For readers who took that as a challenge, Carl Bender, professor of physics, and Edward Wilson, associate professor of mathematics, provide solutions.

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